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Ph.M., F.C.S.

BORN, PHILADELPHIA, MARCH 26, 1847

DECEASED, PHILADELPHIA, JANUARY 1, 1918

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JOURNAL OF PHARMACY

THE AMERICAN
JOURNAL OF PHARMACY

JANUARY, 1918

EDITORIAL.

Greeting.

With the completion of another reckoning of time and the advent of the New Year, commences another chapter of history With the initial number of the ninetieth volume of the American Journal of Pharmacy, it is very appropriate to acknowledge our indebtedness to the numerous contributors and patrons and to the host of readers who throughout all these years have sustained the Journal as the exponent of ethical pharmacy and the recorder of pharmaceutical progress.

It is a pleasure at this time to extend to the many friends of the Journal a hearty salutation and greeting of the season and the sincere best wishes to you all for the year 1918.

The American Journal of Pharmacy has been favored with many valuable papers and its pages will continue to be the forum to which new writers will be welcomed and the old contributors invited "to come again."

The retrospect of yesteryear discloses that it was filled with serious problems confronting the nation and the outlook for 1918 indicates that still more momentous will be the events of this year. Let us pray that ere this new cycle shall be completed peace and happiness may reign throughout the world.

While no one can foretell the events of the year and their outcome, we can predict that new trials and responsibilities will be placed upon pharmacists and these will call for the development of the highest ideals of citizenship and of service to our country and to our profession.

G. M. B.

336581

Congressional Enactment vs. Departmental Regulation.

We in Congress think we enact the laws and we have a clear idea as to our intent and the purpose of the law, but after we have passed a law a Department may frame regulations which modify our intent or even nullify the purpose of the act, and the regulations stand. In a recent interview in which the regulations promulgated by the Treasury Department governing the use and sale of non-beverage alcohol were discussed, the above statement was made by a member of Congress, who has long represented his district in the House of Representatives.

This statement regarding what is continuously becoming more flagrant was unquestionably founded upon existing facts and conditions and voiced a sentiment that not infrequently has been expressed in congressional circles. That Congress will long continue to surrender its constitutional authority or consent indefinitely to a perversion and subversion of its enactments cannot be expected. In the existing status of legislation, with the demand for war measures, the tendency has been toward the centralization of power and the encroachments of the Departments, even though radical, may be temporarily overlooked. In the post-bellum days, when more deliberate thought on such subjects will be given we may expect Congress to again assert its prerogative and reclaim its constitutional authority.

In a previous editorial we referred to the impracticability of certain features of the regulations that have been promulgated for the enforcement of those sections of the Food Control Act and of the War Revenue Act that relate to non-beverage alcohol. Since then, many examples of the unreasonableness of these and the hardships resulting from their enforcement have been presented by physicians, patients, chemists, pharmacists and industrial operators who needed *pure ethyl alcohol for legitimate non-beverage purposes* and whose uses evidently came within the sanction and intent of these congressional acts but not of the departmental regulations.

Ethyl alcohol is an essential raw material of innumerable medicines and in many technical operations, and the physician, pharmacist, chemist and many artisans, whose business demands such, can find no substitute for it.

The moral question of its improper use as a beverage has nothing whatever to do with its proper economical and industrial uses.

While not indifferent to the evils resulting from intemperance, and preferring for many reasons to remain a total abstainer from alcoholic beverages, the writer cannot encourage radical legislation bordering too closely on the fanatical, that fails to recognize the necessities of medicine and the industries for pure ethyl alcohol. Would any sane individual dare to frame regulations, departmental or otherwise, that would demand of the miner of iron ore or the grower of cotton that they must be licensed and under bonded obligation to control to the ultimate consumer the use of their products? The importance of these as raw materials for the metallurgical and textile industries is conceded. Why then is not the importance of ethyl alcohol as a raw material of the chemist and the pharmaceutical manufacturer equally recognized?

The regulations promulgated not only divert the intent of the recent enactments referred to but make it a condition that the pharmacist must violate the Food and Drugs Act and dispense adulterated and poisoned alcohol even on the physician's prescription for alcohol.

Section 6 of the Federal Food and Drugs Act of June 30, 1906, defines the term "drug" and establishes the United States Pharmacopœia and the National Formulary as the legal authority for medicines and preparations *used either internally or externally for the cure, mitigation or prevention of disease.*

Section 7 of that important law in defining adulteration of drugs reiterates the authority of the standards of strength, quality or purity as laid down in the United States Pharmacopœia and the National Formulary.

There can, therefore, be no question raised as to what is the legal standard for alcohol and that this must comply with the requirements of the Pharmacopœia when used or intended for use *for medicinal purposes.*

The regulations promulgated by the Treasury Department make it necessary for the pharmacist to *adulterate alcohol,* even when dispensed on a physician's prescription and for *medicinal purposes,* by the addition of a poisonous substance. Such adulteration and labelling would appear even to the lay mind as an open infraction of the Food and Drugs Act.

An anomalous situation is thus developed, where, by departmental dictum, law-respecting citizens are compelled against their

will and contrary to their judgment and knowledge to commit adulteration of drugs as defined and forbidden by an established law. G. M. B.

EDUCATIONAL ENDOWMENT.

At the last annual convention of the American Pharmaceutical Association there was a noted awakening to the importance of encouraging research and investigation as a means of advancing the profession of pharmacy. This was ably presented by the President of the Association and likewise in the instructive address of the President of the Conference of Pharmaceutical Faculties. Pharmaceutical research and the necessity for its endowment became thus a leading topic and happily the movement for the founding of the American Pharmaceutical Association Research Fund was inaugurated.

Without in the least minimizing the importance of this movement in behalf of professional pharmacy or modifying the views and personal interest then manifested, the writer fears that in this attempt at top-building the solidity of the foundation, which demands first consideration, may be overlooked.

Research and original investigations must necessarily become the province of the professor and of the postgraduate student, and rightly the thought was impressed at Indianapolis that each teacher in a school of pharmacy should be expected to make annually one or more contributions to the sciences and literature associated with pharmacy. These plans provide for the adornment of the upper stories of the building of professional pharmacy and the need for such improvement is recognized and encouraged.

However, the needs of the beginner in pharmacy, the student, the undergraduate in our pharmaceutical schools is even more important, and the education of these should be established on a safe and strong foundation. The students of today are to become the pharmacists of the future and the leaders of the profession in the next generation. It behooves pharmacy, therefore, to give timely consideration to the educational needs of the initiatives so that a body of fundamentally well-grounded, capable graduates may be prepared to assume the burden and carry on the ideals and upbuilding of the superstructure that we are now planning.

As the sum of human knowledge increases, in proportion is increased the educational requirements for the student. The school must be prepared to advance its curriculum and the student must devote more time and energy to acquiring the broader education required. It is to be expected that future progress will demand more thorough pharmaceutical education and necessitate the adoption of more modern methods of instruction with better laboratory facilities and equipments. The amount of the instruction as well as the quality thereof that will henceforth be considered essential cannot be compared with that in vogue a quarter of a century ago or with that acceptable at the present time.

The cost of buildings and the maintenance of schools has also very materially advanced and the extension of curricula and the adoption of improved methods have all been factors that have added to the expense in the management of educational institutions. It is now generally conceded that the fees charged to the student in technical and professional schools are sufficient to pay only a moderate portion of the actual expenses incurred in his education, and that the average student in attendance could not pay a fee equivalent to the cost.

This deficit must be provided for and will necessitate some changes in the policies of the financial management of such educational institutions as are not protected by state or national aid. Ample endowments for educational purposes must be available if pharmacy schools outside of state universities are to continue and pharmacy is to advance and assume its proper position with the other medical professions. The schools that have heretofore carried on their important duties to pharmacy cannot be expected to maintain their prestige and standing without endowments that will assure the income necessary.

That the Philadelphia College of Pharmacy has been able to maintain its commanding position in pharmaceutical education for nearly a century while relying for financial support upon the fees of its students and the voluntary contributions of its members is a unique and anomalous experience, testifying alike to the economic and conservative management and to the loyalty and professional spirit and ability of its faculty. This experience cannot be duplicated and to longer continue this rather precarious condition is to jeopardize the prestige and the future prosperity of this dear old

institution. The necessity for an endowment is too apparent to require any argument, and this must soon claim the attention of the management and merits the earnest consideration of each loyal alumnus and the generous friends of education.

G. M. B.

CHARLES HOLZHAUER.

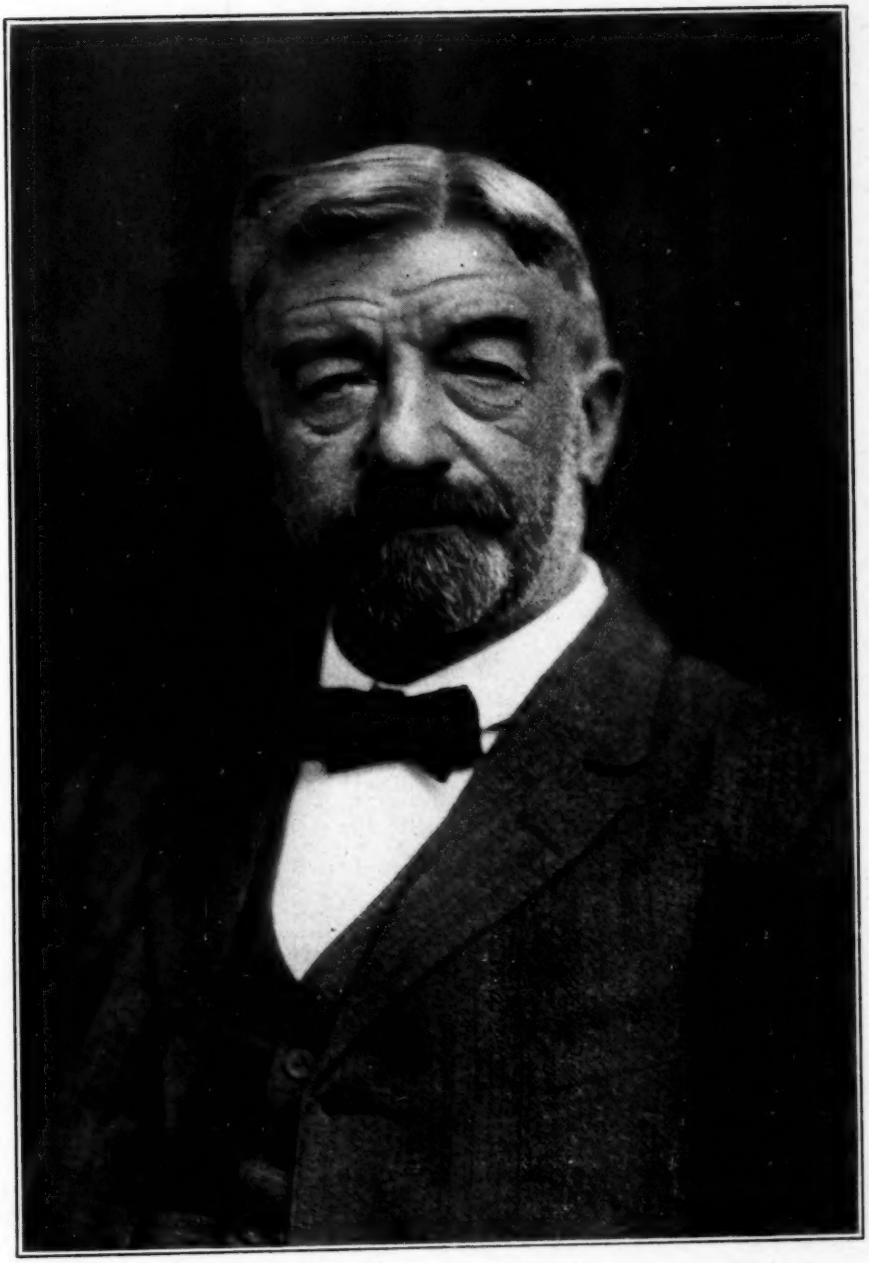
By Edward A. Sayre.

Charles Holzhauer, of Newark, N. J., was born in Cassel, Germany, in 1848. He was the son of Urban Holzhauer and came to this country with his parents when quite small. They settled in Newark.

His early education was received in the Morton Street public school. At a later date he took a special course at the Newark Academy. In 1862 he left school and entered the employ of Dr. Stewart C. Marsh, who was the owner of the old drug store at the northwest corner of Broad and Market Streets. The doctor had an office upstairs; the store was under the management of Peter P. Saunier. The clerk was John Woods, and Charles Holzhauer was the junior, expected to do everything: bottle washing, clean windows, show cases and bottles, sweep and dust, omitting nothing that was at that time considered as the work of the boy who was to learn the drug business. All these things our subject did, and in addition was able to study and pick up sufficient knowledge so that when Mr. Woods died, he became the clerk and another did the drudgery.

In 1870 the store was sold to Dr. W. A. Conover. In 1879 he sold a half interest to Mr. Holzhauer. The doctor was restless and anxious to get out of business, so that a year or so later Mr. Holzhauer became sole owner.

Early in life Mr. Holzhauer joined the Central Presbyterian Church, then located on Washington Street, near Market. He was active in both Sunday-school and church work, serving as superintendent of the former until it was deemed advisable to sell the edifice and move to a new location. He did not go to the new church, but joined the High Street Presbyterian, located conveniently to his home. Here he was just as active in the work until the time of his death. The *Sunday Call* on November 25 contained the following:



Yours Truly
Charles Holzhauer

"Charles Holzhauer, who died in this city last week, one day heard some one make a sneering remark about Sunday-schools. He could not keep silence. 'Let me tell you,' he said, 'that all the success I have had I owe to a Sunday-school. I was just a little German boy living on 'the hill' with apparently a poor future before me. I was taken into the school of the old Central Presbyterian Church, and to the influences which there surrounded me and the valuable friendships which I then gained I attribute such position as I have now.' He was himself a superintendent of Sunday-schools for several years. Every Newarker knows that he was also a successful business man and a respected citizen."

In 1874 Mr. Holzhauer joined the New Jersey Pharmaceutical Association. He was its president in 1881. Ever a faithful attendant, never missing a meeting if he was in the country, he will be missed here more than anywhere else. He was a good listener, with a judicial mind. When a lull came in the discussions (which were often warm and full of fire) he would get up, and, in a few quiet words, say something that carried so much force that he usually had the last word.

One of the old guard, in a letter since his death, said: "When I was active in Association work I always felt that any measure that I proposed, if backed by Holzhauer, was proper, worthy and promised success. He was a grand, good man."

Another said: "What will the New Jersey Association do without Holzhauer?"

The original Pharmacy Law for New Jersey became operative in 1877; Governor Bedle named Charles Holzhauer as one of the five members to carry out its provisions. James R. Mercein, of Jersey City, was president of the first board; three succeeding governors reappointed Charles Holzhauer in 1880, 1883 and 1886, and he served as president from 1880 to 1890, when he retired.

Mr. Holzhauer entered the New York College of Pharmacy in 1871 and was graduated in the class of 1873. He joined the College November 3, 1881, and became a life member in 1882. He was a vice-president in 1891. He became a trustee in 1892, serving as such for five years until 1897.

Mr. Holzhauer joined the American Pharmaceutical Association in 1873, was first vice-president in 1905, local secretary in 1916, chairman of the Section on Historical Pharmacy 1915 and 1916. Was elected president and installed at Indianapolis, 1917.

The New York State Pharmaceutical Association organized in 1879. Mr. Holzhauer attended their meeting in 1883. He was

made an honorary member. He appreciated this very much and frequently attended their meetings. The last one was in 1913 at the Catskill Mountain House.

Mr. Holzhauer was at the Holzhauer Drug Store in his usual good health apparently, on Monday morning, November 19; he went home to lunch with his son about one o'clock, had a nap and was having his usual romp with the grandchildren when, without a moment's warning (with the youngest in his arms), he was stricken at four o'clock and at four-thirty had passed away from a hemorrhage of the brain. The funeral services were held at the High Street Presbyterian Church November 21. The gathering was a notable one. People from every walk in life, men and women, were there, with many prominent business men of the city, and pharmacists from such nearby points as could gather on short notice, Acting President A. R. L. Dohme and four ex-presidents of the American Pharmaceutical Association and numerous ex-presidents of the New Jersey Association being in evidence. Burial was in Mt. Pleasant Cemetery, of which he had been one of the managers.

Mr. Holzhauer is survived by a widow, Mrs. Louise S. Holzhauer, a son and four grandchildren; also by two sisters.

PODOPHYLLUM PELTATUM LINNÉ.[1]

NOTES ON THE TIME OF COLLECTION.

By G. A. Russell,

Washington, D. C.

The collection of *Podophyllum peltatum*, or, as it is more commonly known, mandrake, is carried on in more or less of a haphazard manner through the entire growing season. The collector does not concern himself with the quality of the rhizome, his one object being to collect as much as possible each day in which he labors. From the results obtained in this investigation it is clearly shown that a campaign carried out with the idea of giving the collector proper information as to the time of collection would benefit not only the collector but the manufacturer of podophyllin as well.

[1] Published by permission of the Secretary of Agriculture.

In the spring of 1916, the writer had occasion to collect a quantity of mandrake rhizome in Fond du Lac County, Wisconsin. At that time it was decided to collect samples throughout the growing season and later to make comparative examination of these samples. Accordingly a quantity of drug was collected at various periods from May 10 until June 14. All material collected was from the same patch found growing in a rather open or glade-like second growth of poplar and sumach. The remainder of the samples were collected in Green Lake County, Wisconsin, from June 14 to October 8, and came from the same type of soil as the earlier collected samples.[2] The entire series of samples may be considered as very representative of mandrake growing in Wisconsin, since it is almost invariably found growing in greatest abundance in open or semi-open glades on what is known as Miami silt loam, deep phase.

Each sample as collected was washed free of all adhering soil, the roots removed, and the rhizome and roots weighed separately and then carefully dried in the shade by means of artificial heat which never exceeded 50° C. After drying the rhizome and roots were again weighed, packed in cloth bags, and preserved in a dry place until examined. The results of the moisture determinations are given in Table I.

TABLE I.

Percentage of Moisture in Fresh Rhizome and Roots of Podophyllum peltatum.

Material	Lot number	Date collected	Moisture lost in drying (per cent.).	Remarks
Rhizomes ...	1	May 10, 1916	78.58	Plants just coming out of the ground.
	2	May 23, "	80.00	Plants just in bud.
	3	June 14, "	80.38	Plants at close of flowering season.
	4	July 30, "	66.66	Fruit ripening on plant.
	5	Aug. 4, "	66.66	Plant foliage beginning to dry up.
	6	Oct. 8, "	65.00	Plant foliage completely dried away.
Roots	1a	May 10, "	78.95	Same as lot No. 1.
	2a	May 23, "	80.27	" " " " 2.
	3a	June 14, "	81.00	" " " " 3.
	4a	July 30, "	76.93	" " " " 4.
	5a	Aug. 4, "	76.93	" " " " 5.
	6a	Oct. 8, "	70.05	" " " " 6.

In the foregoing table Lot No. 1 represents a spring-collected drug and Lot No. 6 a fall-collected drug. The amount of moisture

[2] Collected by N. R. Mueller, of the Office of Drug-Plant and Poisonous-Plant Investigations, Bureau of Plant Industry.

in the freshly dug rhizome and roots is of interest in that it gives an index as to the amount of water present during the greatest activity of the plant. The amount of rainfall exerts some influence on the amount of moisture present in fresh herbs and roots and in order to compare the percentage of moisture present with the precipitation in inches, the rainfall by months at Fond du Lac, Wisconsin, is tabulated in Table II.

TABLE II.

Rainfall in Inches Each Month during the Growing Season of Podophyllum peltatum in 1916 at Fond du Lac, Wisconsin.

Month.	Precipitation in inches.	Moisture in rhizome.		Moisture in roots.	
		Lot.	Per cent.	Lot.	Per cent.
April	2.19	1	78.58	1*a*	78.95
May	3.58	2	80.00	2*a*	80.27
June	4.88	3	80.38	3*a*	81.00
July	0.43	4	66.66	4*a*	76.93
August	4.72	5	66.66	5*a*	76.93
September	4.45	6	65.00	6*a*	70.05
October	4.76				

The largest amount of water present in both rhizome and roots occurs in the month of greatest rainfall and also when the plants are at the height of growth. In July but very little rain fell and the lack of moisture is reflected in the rhizome and to a less degree in the roots. In addition to lack of moisture, the plant had at this time passed its greatest growing period and was now beginning to become dormant, which accounts for some of the decrease in moisture content. This decrease in moisture content is more marked as the plant becomes more and more dormant even though the rainfall was plentiful.

Eight months after the last lot of rhizomes and roots was collected all the samples were examined. The dry material was ground to a No. 60 powder and the following determinations made on the powdered material: moisture, soluble ash, insoluble ash, total ash, and resin.

Moisture.—The moisture was determined by heating a weighed portion of the ground material in a flat milk dish at a temperature of 100° C. for two-hour periods until the weight was constant. After each heating the sample was cooled in a desiccator over calcium chloride. The loss in weight is taken as the amount of mois-

ture present. The results of moisture determination on the dry powdered drug are given in Table III.

Ash.—The ash was determined as outlined in Bureau of Chemistry Bulletin No. 107 (Revised),[3] both soluble and insoluble ash being determined in the oven-dried material. The results are also given in Table III.

TABLE III.

Percentage of Moisture and Ash Present in Air-dried Podophyllum peltatum.

Material.	Lot number.	Moisture. per cent.	Ash per cent. Soluble.	Insoluble.	Total.
Rhizome.....	1	8.66	0.566	3.762	4.328
	2	8.82	0.650	3.770	4.420
	3	10.06	0.764	3.001	3.765
	4	9.12	0.579	3.531	4.110
	5	9.27	0.887	3.884	4.771
	6	8.61	0.969	3.948	4.917
Roots.....	1*a*	8.91	0.843	5.656	6.499
	2*a*	9.34	0.959	5.858	6.817
	3*a*	9.88	0.604	4.369	4.973
	4*a*	9.74	0.977	4.446	5.423
	5*a*	9.55	1.084	4.451	5.535
	6*a*	8.88	1.202	4.068	5.290

The amount of moisture remaining in air-dried podophyllum varies with the time of collection. Spring and fall-collected samples contain practically the same amounts of moisture while samples collected at intermediate periods vary to a considerable degree. Samples 3 and 3*a*, collected when the plant was at the height of its growing period, contain the greatest amount of moisture, both in the fresh and in the air-dried drug.

A comparison of the ash content of both the roots and rhizome is of special interest. The Pharmacopœia, IX, states that "Podophyllum yields not more than 3 per cent. of ash." None of the samples examined yield as low as 3 per cent. of ash. All of the samples of rhizome yield over 4 per cent. of ash, with the exception of sample No. 3, which yields 3.765 per cent. Several checks run on each sample yielded like results. The ash of the roots was found to be considerably greater than that of the rhizome, in some samples running to over twice the amount specified in the Pharmacopœia. The latest Pharmacopœia allows the roots to enter as part

[3] Official and Provisional Methods of Analysis. United States Department of Agriculture, Bureau of Chemistry Bulletin No. 107 (Revised), 238.

of the official drug. The ash content of the rhizome and roots combined will average about 5 per cent. in the samples examined. Since the limit of ash in podophyllum is specified as a test for doubtful samples it will be well to bear in mind that the drug examined in this investigation was absolutely authentic and yet had an ash content much above the specified 3 per cent.

Resin.—The resin was extracted from each sample by the method outlined in Pharmacopœia, IX. The temperature of the water used was uniformly kept at 6° C., and all precautions were taken to handle each sample in the same manner. In no case did the resin coalesce or aggregate into lumps during drying and it was not essentially necessary to powder in a mortar, although each lot was thus treated in order to make it absolutely uniform. The results of the resin determinations are given in Table IV.

TABLE IV.

Percentage of Resin of Podophyllum in Air-dried Podophyllum peltatum.

Material.	Lot number.	Resin (per cent.).	Color of resin.
Rhizome....	1	6.15	Greenish yellow
	2	6.00	Light greenish yellow
	3	4.57	Yellow
	4	3.60	Greenish yellow
	5	3.30	Dark greenish yellow
	6	4.22	" " "
Roots.....	1a	7.76	Greenish yellow
	2a	7.10	Light greenish yellow
	3a	5.40	" " "
	4a	3.30	Greenish yellow
	5a	4.15	Light greenish yellow
	6a	4.96	" " "

From the results tabulated in Table IV it will be seen that the spring-collected drug yields the largest percentage of resin. At this time the plants were just sending up aërial shoots and the activity within the plant cells was probably at a maximum. As the plant grows the resin content in the dry material lessens. When the plant had reached its maximum growth the percentage of resin present was at the lowest point. An increase in resin is noted in the drug collected after the plant had begun to die away in the fall.

Recalculated on a basis of green weight the results appear in a different light. The recalculations are given in Table V.

TABLE V.

Available Resin in One Kilogram of Fresh Podophyllum peltatum.

Material.	Lot number	Weight fresh drug (grams).	Available air-dried drug (grams).	Available resin (grams).
Rhizome.....	1	1000	215	13.2
	2	"	200	12.0
	3	"	200	9.14
	4	"	334	12.02
	5	"	334	11.02
	6	"	350	14.77
Roots.....	1a	"	210	16.29
	2a	"	200	14.20
	3a	"	190	10.26
	4a	"	220	7.26
	5a	"	220	9.13
	6a	"	300	14.88

But since the ratio of roots to rhizome does not remain constant throughout the season the amount of resin available becomes even more marked when the official drug is taken into consideration. It was found that the roots constituted a certain increased percentage of the total weight of the drug as the growing season advanced until the plant reached maturity. The results of resin determinations on the official drug, rhizome and roots, fresh material, are given in Table VI.

TABLE VI.

Available Amount of Resin in One Kilogram of the Official Drug of Podophyllum peltatum, Fresh Material.

Lot number.	Roots compared with total weight (per cent.).	Available air-dried drug (grams).	Available resin (grams).
1	23	214	13.94
2	25	200	12.55
3	27	198	9.47
4	32	201	7.01
5	30	302	10.55
6	21	340	14.80

From the collector's point of view, drug collected in the late fall will yield him the best returns. The manufacturer, on the other hand, will necessarily have to work over more powdered material for a slight gain in the amount of resin.

The various resins were further examined, and the data obtained on their behavior toward solvents as well as the ash content are tabulated in Table VII.

TABLE VII.

The Ash Content of the Resin of Podophyllum peltatum and the Percentage of Resin Soluble in Various Solvents.

Material	Lot number	Ash (per cent.).	Soluble in		
			Alcohol (per cent.).	Ether (per cent.).	Chloroform (per cent.).
Rhizome	1	0.739	98.68	78.32	71.00
	2	0.377	99.12	80.03	73.25
	3	1.676	93.68	71.01	62.68
	4	2.049	91.80	70.50	62.75
	5	1.566	91.16	70.50	62.30
	6	0.731	98.51	77.00	68.50
Roots	1*a*	0.393	98.31	74.22	68.25
	2*a*	0.208	99.75	76.08	70.00
	3*a*	0.362	98.13	73.00	60.00
	4*a*	1.150	97.47	68.46	58.75
	5*a*	0.481	93.80	69.13	61.14
	6*a*	0.418	98.32	73.31	66.23

When treated with hot water lots Nos. 1, 2, 3, 6, 1*a*, 2*a*, and 6*a* went into practically complete solution. The remainder of the lots could not be wholly dissolved in hot water with several minutes' boiling. Like results were obtained with sodium hydroxide and with potassium hydroxide except that all the lots were soluble when the alkaline solution was heated.

The Pharmacopœia directs that resin of podophyllum should contain not over 1.5 per cent. of ash. Three of the samples of resin from the rhizome contain more than 1.5 per cent. of ash, while all the resins from the roots contain considerably less than 1.5 per cent. of ash, in fact with one exception, that of lot 4*a*, they all contain less than 0.5 per cent. Those resins in which the ash content is above 1.5 per cent. do not conform closely to the other Pharmacopœial requirements. It is quite probable that the requirements were drawn for podophyllum and the resin of podophyllum with the mid-season collected material in mind.

A small percentage in every sample examined was found insoluble in alcohol. This percentage of insoluble resin increased with the growing season and was greatest when the aërial part of the plant had reached its maximum growth and was beginning to die away. Like solubility results were obtained with ether and with chloroform.

Summary and Conclusions.—Six samples of *Podophyllum peltatum* were collected in Fond du Lac and Green Lake Counties,

Wisconsin, from the same type of soil, during the growing season of 1916. These samples were examined in August, 1917.

The moisture content of the fresh drug was greatest at the height of the growing season and least after the plant became dormant in the fall.

The ash content of mixed rhizome and roots was found to be in excess of that specified by the United States Pharmacopœia, IX.

The greatest percentage of resin was found in the early spring-collected drug and this resin conforms closely to the Pharmacopœial requirements.

The spring-collected drug, gathered just as the plants began to show above ground, and the late fall-collected drug are both worthy of consideration. The spring-collected drug yields high in resin which conforms more closely to the requirements than does the fall-collected drug. The latter calculated on the basis of fresh material will yield more resin since the rhizome and roots contain less water than the spring-collected drug.

To secure the maximum amount of resin the rhizome and roots of *Podophyllum peltatum* should be collected in the fall of the year after the aërial part of the plant has died down. If spring collection is attempted it should be done before the plant begins to send out aërial shoots. Later than this the resin decreases and the moisture content of the rhizome and roots increases.

From the collector's point of view the fall-gathered drug is best, since it gives the highest yield of air-dried material. The manufacturer will prefer the spring-collected drug since the resin content is high and the amount of dry material to be worked over is relatively much less than when the drug is collected in the fall.

DRUG-PLANT AND POISONOUS-PLANT INVESTIGATIONS,
BUREAU OF PLANT INDUSTRY,
U. S. DEPARTMENT OF AGRICULTURE.

THE PREPARATION OF DICHLORAMIN T. AND CHLORINATED EUCALYPTOL 1.2.[1]

By Robert B. Krauss.

From the Henry Phipps Institute of the University of Pennsylvania.

Para toluol sulphondichloramide was first prepared by Kastle, Keiser and Bradey[2] in 1896, who also prepared a number of related compounds. Since its introduction under the name of dichloramin T. by Dakin, Lee, Sweet, Hendricks and LeConte,[3] the production of this substance on a large scale in pure form, as well as that of suitable solvents for its application, have become problems of importance.

As originally used for this purpose dichloramin T. was dissolved in a prepared eucalyptol (chlorinated) and used in this condition or further diluted with prepared paraffin oil (chlorinated).

It was early recognized by the author that the products obtained by chlorination may vary considerably, according to the conditions of chlorination. By continued chlorination, under certain conditions, a chlorinated eucalyptol, specific gravity 1.2, is obtained, which has been extensively studied by surgeons. As a solvent for dichloramin T. it seems to have all the desirable qualities with the exception of the solution being definitely stable. There seems to be some reason to believe that chlorinated eucalyptol 1.2 itself has some therapeutic value.

This evening I will present an outline of the methods for preparing para-toluol-sulphon-dichloramide, and chlorinated eucalyptol 1.2, and the specifications for both as prepared for federal medical authorities.

1. Preparation of the Sulphonic Acids.

Beginning with toluol, the sulphonic acids are formed by mixing equal parts of concentrated sulphuric acid and toluol. On shaking or even on standing the toluol dissolves in the acid. When the top

[1] Journal of the American Pharmaceutical Association, January, 1918. Read before the Philadelphia Branch of the American Pharmaceutical Association.

[2] American Chemical Journal, 18, 491, 1896.

[3] Journal American Medical Association, 69, 27, 1917.

layer of toluol has disappeared the sulphonation mixture is poured into water and neutralized with lime. After filtering, the solution of the ortho and para calcium sulphonates is treated with sodium carbonate and boiled to form the sodium salts and precipitate calcium carbonate. The filtered solution is evaporated to dryness and carefully dried.

2. Preparation of the Sulpho-Chlorides.

The powdered sodium sulphonates are treated with an equal weight of phosphorus pentachloride. After the pentachloride has disappeared the semifluid mass is heated on the water bath to complete the reaction and then poured on ice. The para sulpho-chloride crystallizes after a time while the ortho derivative is a liquid. They are separated by centrifuging.

3. Preparation of the Sulphon-Amide.

The para sulpho-chloride is melted on the water bath and treated with an excess of ammonium carbonate. The odor of sulpho-chloride should no longer be observable. The mixture of ammonium carbonate and sulphon-amide is extracted with water and dried. If the sulphon-amide is not pure white it should be recrystallized from hot water.

4. Preparation of the Dichloramide.

The toluol para sulphon-amide is dissolved in ten parts of 1 : 10 caustic soda (39° Be.) and diluted with twenty parts of water. The solution is filtered through glass wool and then through double filter paper. This removes iron hydroxid from the strongly caustic solution.

Chlorine gas from a cylinder is then passed through the solution, cooled externally by ice, until a voluminous white precipitate of toluol p. sulphon-dichloramide is formed. This is filtered off, thoroughly washed twice with 5–8 parts of water and finally with enough 10 per cent. alcohol to make a thin paste. The dilute alcohol washing should be done very quickly and the substance filtered off with aid of a vacuum filter. It is then dried at a temperature not exceeding 55° C. in a vacuum dryer.

The method has the advantage that it is very rapid and avoids

the use of chloroform as a solvent. It was developed in order to produce a dichloramin T. which would be comparatively stable. The product has a negligible ash and a good chlorine content, but no free chlorine on standing.

Calculated Cl = 21.54 per cent., Found Cl = 21.42 per cent.; 21.37 per cent.

The very considerable work done in the chemical laboratory of the Institute on the preparation and distribution of dichloramin T. for surgical purposes has suggested the following specifications as most suitable for this material when used as a disinfectant.

Physical Properties.

White powder or crystals with slight yellow green tinge. Melting Point 78–84° C.

Chemical Properties.

Soluble in cold chloroform with slight to no turbidity. (Any turbidity must be removable by shaking with anhydrous calcium chloride.) Soluble in prepared eucalyptol Dakin and chlorinated eucalyptol 1.2. Ash: not over .2 per cent.; chlorine content, 29.0 per cent. to 29.54 per cent.; calculated Cl 29.54 per cent.

The solubility in chloroform or similar organic solvent is important in that it shows presence of inorganic impurities, calcium salts, etc. Material should not have strong odor of chlorine, showing instability. The melting point may vary within the limits indicated owing to moisture. Sharp drying will decompose the substance.

Solvents.

The eucalyptol, as first proposed[4] by Dakin and Dunham, was chlorinated with potassium chlorate and hydrochloric acid according to the following method:

Five hundred Cc. eucalyptol (U. S. P.) are treated with 15 Gm. potassium chlorate and 50 Cc. concentrated hydrochloric acid. After twelve hours the oil is well washed with water and sodium carbonate solution. Dry sodium carbonate is added to the oil and the mixture is allowed to stand twenty-four hours. It is then filtered and dried with a little calcium chloride.

[4] Dakin and Dunham, *British Medical Journal*, June, 1917.

This method has the disadvantage that no definite amount of chlorine enters the eucalyptol. The chlorination depends on the rate of adding chlorate and hydrochloric acid as well as the light in which the process takes place. Samples may have 1 per cent. chlorine present or scarcely any, depending on whether chlorination took place in sunlight or on a dark day. The specific gravity of this oil may vary from .930 to .935.

Preparation of Chlorinated Eucalyptol 1.2.

It was found that by passing chlorine gas from a cylinder into eucalyptol the reaction proceeded much further than by the chlorate method described above. When a specific gravity of 1.20 was reached a comparatively heavy oil, much less volatile than eucalyptol, was obtained.

The results of the use of this oil are well known to-day; briefly, it was found that it is almost as good a solvent for dichloramin T., that it can be used in full strength on the skin and in open wounds and that the use of paraffin oil either as a diluent or as a means of preventing sticking of dressings is unnecessary.

The following is a sufficiently detailed statement of the method by which this oil is obtained:

Through a glass tube reaching to the bottom of a five-gallon bottle containing about 10 kilos of eucalyptol is passed chlorine from a cylinder. The oil should have a boiling point of 176–177° C. and a specific gravity of .925 to start. The process should be carried on in good daylight.

During the chlorination the temperature rises and should be kept below 80° C. by regulating the chlorine stream. Hydrochloric acid is given off and may be absorbed in alkali.

When a specific gravity of 1.19 is reached the oil is chlorinated sufficiently and the process is interrupted. The oil is then washed with about four liters of water, then shaken thoroughly with 250 Gm. dry sodium carbonate and allowed to settle. After carefully decanting from the carbonate, about 500 Gm. fused calcium chloride are added and the whole again shaken. On standing, preferably over night, the oil is filtered, bottled and is then ready for use. It is a white or slightly amber-colored oil, specific gravity 1.2, with a chlorine content of about 31 per cent. Such an oil will readily dissolve 20 per cent. of dichloramin T. which solution may keep in an amber bottle without decomposition for a month.

Further Products of Chlorination.

By the further chlorination of the 1.2 oil products may be obtained having a specific gravity of 1.5 and higher. This may be carried out by chlorinating directly at 100° C. or with a solvent such as chloroform at its boiling point. The oil of specific gravity 1.4 is amber colored and of the consistency of molasses. The dichloramin is still soluble, although to a less extent. The future may find a use for this type of oil, since the increased viscosity presents an advantage in certain cases.

Dichloramin T. prepared as given above is freely soluble in chlorinated eucalyptol 1.2.

The solutions should be prepared about as follows:

Preparation of 7½ Per Cent. Solution.

Measure off 150 Cc. of oil into a dry brown bottle, preferably one with a glass stopper. Add to this 11.5 grams powdered dichloramin T. This will dissolve, if shaken occasionally, in about an hour. It should *not* be warmed. This makes a 7½ per cent. solution, and is used for all dressings subsequent to the first two or three. This solution should keep for two weeks at least. If this is used in an atomizer, as directed, it has been found that one filling of the usual atomizer reservoir will dress from 100 to 150 cases.

Preparation of 20 Per Cent. Solution.

This solution should be made up about 25 Cc. at a time, using 5 Gm. of dichloramin T. to 25 Cc. of oil. It is most quickly accomplished by trituration and should be kept in a brown bottle. This is applied to fresh wounds and for the first treatment of infected wounds and focal infections. It is most conveniently applied with an ordinary medicine dropper. This solution is good until a crop of fine crystals appears in it, which may happen in three days, although it may last for ten days or more.

When using the solution in an atomizer, the reservoir of which is of white glass, it should be kept in the dark whenever possible and never exposed to sunlight. Light greatly accelerates the decomposition of dichloramin T. in solution. The following points should receive consideration in its clinical use.

1. Surgical asepsis, as perfect as possible, should be used at both the primary operation and subsequent dressings.

2. At the primary operation all wound surfaces should be covered and all crevices filled with the 20 per cent. solution. Subsequent dressings are made with the 7½ per cent. solution.

3. Before the oil is applied the surfaces of the wound should be as dry as possible; free from blood and water.

4. Drainage should be avoided in all wounds closed by suture.

5. It has been suggested that with local infections, such as boils, carbuncles and abscesses, an incision made somewhat earlier than usual with the free application of the 20 per cent. solution of dichloramin T. will frequently sharply limit the progress of the infection.

6. This preparation is essentially non-irritating unless confined by unduly heavy or impervious dressings. If so confined, it may blister.

In conclusion I wish to acknowledge the coöperation of Drs. P.A. Lewis and W. E. Lee, and also the chemical assistance of Miss Elizabeth Hill.

December 4, 1917.

THE USE OF HYDROFLUORIC ACID IN THE GLASS INDUSTRY.

By John Gleichman.

For polishing lead, potash, soda and lime glass, hydrofluoric acid of 60 per cent. strength is necessary. There is no set formula for treating the glass, all attending successes depending largely upon the temperature at which the acid is used, *i. e.*, 90° F. This temperature should not be exceeded, on account of melting the wax, which acts as a coating and protects that part of the blank not to be polished.

Lead or Potash Glass.—The best results are obtained by preparing the dipping acid in a lead water rim tank surrounded by water bath—90° F. To the hydrofluoric acid continue to add oil vitriol gradually until contact is obtained: a white coating, referred to as mud (silico fluoride), forms, indicating that the acid solution is ready for use. Its operation depends entirely with the dipper as to the required number of immersions (1, 2 or 3)—one dip of 12/15 seconds in newly prepared acid in some instances gives satisfaction,

but better results are obtained from a three-dip process of 5 seconds each, to be increased from time to time as the acid weakens.

SPENT ACID is that acid which, after a day's work of 5/6 hours, is reduced from 60 per cent. to 30 per cent., which can be carried over each succeeding day by means of drawing off the acid in a reserve tank, avoiding the possibility of conflict with the mud which deposits at the bottom of tank—the stronger acid can be added to the weaker until contact is obtained; by this method you establish a means of unceasing use without waste of a single pound of material.

SODA GLASS.—This is inclined to be more or less brittle and requires careful treatment—to one just starting in to acquire a good polish precaution is necessary in the beginning until the operation completely satisfies the dipper. We would, therefore, advise that a mixture of 2 parts hydrofluoric acid and 1 part oil vitriol be used in 5 separate dips as follows: 5, 8, 10, 12, 14 seconds each, and by this means one can be governed by their own judgment by decreasing the number of dips to 2 of from 20/25 seconds each. Care must be taken in each instance to not only allow of a good drainage, but the glass must be thoroughly dry before being placed in each successive dip, otherwise it will run and leave blistered and blurred imperfections.

POLISH.—It is the aim of every cutting shop to establish the best possible polish: this can be had by treating the glass as already described—but by preparing the dipping acid the night preceding the day's work, gives the acid an opportunity of mellowing by means of proper diffusion—a well-provided hood covering the tank is essential in order to prevent the escape of gas.

THE POP.—In the acid so frequently referred to by the dipper, all depends upon the manner of care devoted to its proper keeping. It so frequently occurs that carboys containing acid are allowed to remain at the freight station or in the outer yard when the temperature is below freezing—cold weather contracts and when the stopper is removed, the pop is lacking, all due to neglect of the operator. Acid should at all times be kept in a warm place, under which conditions best possible service is obtained.

LEAD FLUORIDE is that deposit which sometimes settles at bottom of carboy, which when agitated drifts into the dipping tank and adheres to the glass, causing much inconvenience; care, therefore,

should be exercised in having the acid, which, if at times cloudy, can be allowed to settle and poured off clear—thus avoiding additional labor, and possibly an additional dip or two.

LIME GLASS.—A mixture of three parts of oil of vitriol and one part hydrofluoric acid 60 per cent. Begin operation with four successive short dips of from 2, 3, 4 and 5 seconds each. Lime glass differs from lead glass in being less uniform, which means that better results are obtainable when atmosphere is clear and dry. Cloudy and inclement weather sometimes blurs the glass, due to the acid's affinity for moisture. This can be obviated, however, by adding hydrofluoric acid in gradually increased quantities.

BLOEDITE GLASS.—A mixture of equal parts hydrofluoric acid 60 per cent. and oil of vitriol. Begin by giving the glass a first dip of only one second. The reason for this is to clear the surface so as to better enable you to make a finished job. Unless this is done the acid clings to the glass and becomes smoky and sticky. Then proceed with successive dips of 3, 5 and 8 seconds each, and, if not quite clear, another short dip of 3 seconds. The glass should be well drained before each dip.

LEAD AND MANGANESE GLASS WITHOUT POTASH.—For this use a mixture 7 parts hydrofluoric acid and 2 parts oil vitriol. First dip 20 seconds; then three successive dips of 10 seconds each.

SPENT HYDROFLUORIC ACID.—Best incorporated with new hydrofluoric acid as follows, and corresponding with the above dip by mixing:

6 parts spent hydrofluoric,
6 parts hydrofluoric 60 per cent.,
1 part oil vitriol.

FUMED GLASS.—Due to improper mixture of dipping acid. This difficulty overcome by using pumice brush and pumice buff afterwards on the plain metal, and thereafter re-dip.

FORMULA FOR STAMPING.—2 parts hydrofluoric acid, by weight, to 1 part carbonate ammonia, by weight, using sufficient sulphate barytes to thicken so as to make a paste. This paste can be spread on a pad and applied with a rubber stamp. Either 48 per cent. or 52 per cent. hydrofluoric acid should be used—48 per cent. for lead glass and 52 per cent. for lime glass. This stamping acid should be made up in small quantities only as it will not keep any length of time.

DIGITALIS THERAPY AND THE PRESENT SHORTAGE IN DRUGS.[1]

By Robert A. Hatcher, M.D.,

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The following brief review of the present status of the materia medica of the digitalis group and its relation to therapeutics has been prepared at the request of Prof. Julius Stieglitz, chairman of a committee on synthetic drugs, appointed by the National Research Council, because of the present want of many preparations of this group that have come into more or less widespread use.

All of the members of this group, including many crude drugs and their galenic preparations, as well as glucosidal active principles, exert a qualitatively similar therapeutic action on the heart when they are brought into the blood stream; but the various members of the group vary enormously in their activity and in the rate of their absorption from the alimentary tract.

These differences in behavior of the different members of the group have resulted in the development of faith in one or the other of the numerous preparations and specialties, and a corresponding distrust of all others on the part of those physicians who have not appreciated the importance of dosage and the several methods of administration best suited to the individual preparation in securing the results aimed at. Those who are thus left without the preparation to which they are accustomed feel the want keenly, and the present discussion is designed to point the way to relief from these conditions.

Digitalis, digitoxin, strophanthus, strophanthin and ouabain exert the same kind of action on the heart directly, and on the cir- action indirectly, as previously stated in different words; but the action of digitalis and its most active principle, digitoxin, is far more lasting than that of the others. It is necessary to caution the reader against confusing "actions" and "effects" in this connection.

When an attack of acute cardiac dilatation is relieved by any member of the group whatever, the effect is permanent, provided the cause of the failure is not continuously active; but in various

[1] Reprinted from the *Journal of the American Medical Association.*

forms of chronic cardiac disease which require more or less continuous digitalis medication, the duration of effect and the duration of action are nearly the same. In such cases the duration of action and effect of digitalis and digitoxin are far greater than those of the other members of the group, in which case the difference is overcome by increased frequency of dosage, or, what amounts to the same thing, a relatively—not actually—larger dose of equal frequency.

Digipuratum is one of those specialties that have come into wide use partly through their intrinsic value, but mainly because of a most persistent and effective campaign of adroit advertising, and it may be taken as an example of the specialties on which all too many clinicians have come to fix their sole reliance in digitalis therapy. It is certainly true, however, that while digipuratum, like many other specialties, exerts a satisfactory cardiac action, it is in no way essential, since exactly the same actions can be induced by official members of the group in the hands of any one who masters the really simple technic of administration.

In all cases requiring digitalis therapy, digitalis itself in the form of the powder, the tincture, fluidextract, extract or infusion may be used orally with the sole exception of those relatively rare cases in which immediate relief is imperative, and which require intravenous or intramuscular administration. In such cases the typical digitalis action can be induced immediately by the intramuscular or intravenous injection of strophanthin or crystalline ouabain (so-called crystalline strophanthin, not true crystalline Kombé strophanthin, which is not commercially available).

It is necessary to call attention again to the difference between an immediate action and immediate effect, because it has long been taught, without a particle of real evidence, that the action of digitalis cannot be induced promptly. The whole range of digitalis action up to the maximum, that is, cardiac stoppage, can be induced within from five to fifteen seconds by the intravenous injection of digitalis tincture, deprived of its alcohol, or digitoxin. This simple experiment disposes forever of the mischievous claim that digitalis action is slow. The *effect* of therapeutic doses is *gradually* induced; the *action* is *immediate*. A bullet fired through the heart *acts* instantaneously; the *effect* is a fatal hemorrhage, the rapidity of which depends largely on the size of the wound. With suitable dosage, digi-

talis exerts its action in much less time than was formerly believed to be possible.

The action of an intravenous dose of strophanthin or ouabain is not so lasting as is that of a corresponding dose of digipuratum, but it lasts until it can be supplemented by the oral administration of digitalis.

Another fallacy that dies hard is that digitalis and digitoxin act on the vessels and cause high blood pressure, and that they are therefore contraindicated in cases in which the blood pressure is already high. This has been the greatest stumbling block in the way of the use of digitalis, next to that of regulation of dosage. Every one of the digitalis bodies acts on the vessels when enormous doses are passed directly into them, but this action is never induced by therapeutic doses. The contrary belief rests on the observation of the effects of massive doses in animal experimentation, and is not supported by any careful clinical observations or experiments with therapeutic doses.

Among the less important fallacies that have severally contributed to the distrust of digitalis and have been utilized by manufacturers to their own advantage, the following may be mentioned briefly: All drugs, preparations and active principles of this group without exception cause nausea and vomiting in overdoses through their action on the vomiting center in the medulla—not through any direct action on the stomach; hence it cannot be avoided by any mere change in the mode of administration, or mere choice of preparation, but only by proper regulation of the dosage—and by dosage I mean the amount which actually enters the blood stream and which alone can act on the heart.

None of the drugs of this group are actively diuretic through any direct action on the kidneys. They induce diuresis solely through an improved circulation. That does not mean either a higher or a lower blood pressure in every case; it means a more effective circulation, one better adapted to the needs of the individual patient. This sometimes means an increase, sometimes a decrease, in pressure.

All digitalis galenicals, tincture, infusion, extract and fluidextract, exert the same kind of action, because they all contain all of the active principles of the drug.

All digitalis bodies without exception have the disadvantage of being absorbed somewhat slowly and irregularly from the alimentary

tract. Digitalis tincture, as well as the infusion and fluidextract, are absorbed *fairly* promptly; strophanthus and strophanthin, ouabain, convallaria preparations, apocynum preparations, and wahoo are absorbed very irregularly. This is of prime importance, because it requires the administration of large doses of these drugs in order to insure the therapeutic effects; but rapid absorption occurs occasionally under conditions that are not understood, and severe, or even fatal, poisoning may result. The latter drugs should never be used for oral administration.

There is no difficulty in getting standardized digitalis preparations, and these do not deteriorate rapidly. Slight deterioration is not important, because the drug must always be given until a definite action is induced, and this varies with every patient; since there is no fixed dose that is applicable to different patients.

Tincture of digitalis contains only traces of fat, and that is no more disturbing to the stomach than an equal amount of other fixed oils or fats.

Granted that a correct diagnosis has been made, digitalis therapy becomes largely a matter of correct dosage, including the proper method of administration, which is nearly always oral. It is beyond the scope of this paper to consider dosage and methods of administration in detail, the present purpose being to point out to the clinician the resources that he has at his command; but he will find valuable suggestions in the following papers:

"A Clinical Study of Crystalline Strophanthin," by Harold C. Bailey.[2] In this paper the author reports most careful clinical observations with crystalline ouabain, formerly called crystalline strophanthin.

"The Toxic Actions of Digitalis on the Heart," by the same author.[3] This is an excellent study of the toxic actions of digitalis that frequently escape attention.

"Digitalis Dosage," by Cary Eggleston.[4] This is perhaps the best recent study of the method of administering digitalis whereby prompt effects are induced after oral administration.

Fraenkel and others have published numerous papers dealing with the intravenous administration of strophanthin.

I am well aware that many readers will be inclined to deny many

[2] *Jour. Pharmacol. and Exper. Therap.*, 1909, 1, 359.
[3] *Am. Jour. Med. Sc.*, 1911, p. 1.
[4] *Arch. Int. Med.*, July, 1915, p. 1.

statements made in this brief article, but I can only assert that they are based on careful clinical and experimental observations and are not contradicted by any recent careful studies.

ISOLATION OF TETANUS TOXIN.[1]

Heretofore tetanus toxin and other toxins as well as ferments have defied the efforts to isolate them from the mixtures in which they naturally occur. For this reason we know little of the real nature and chemical structure of these remarkable substances; but a way to progress seems to have been found, as London and his coworkers in the Institute for Experimental Medicine in Petrograd now report that under certain conditions tetanus toxin and pancreatic ferments may be carried down on colloidal particles. They find that by the addition of 17 per cent. of ammonium sulphate to culture fluids in which tetanus bacilli have been growing; by centrifugation, the resulting sediment being thrown away; and then by the addition of from 1 to 3 per cent. more of ammonium sulphate, a sediment is obtained which contains the tetanus toxin. This sediment may be dried in vacuum and rinsed repeatedly with ammonium sulphate without thereby reducing the toxicity of the toxin, as minute a quantity as 0.00000002 Gm. being fatal for white mice in two days after subcutaneous injection. They also report that by a similar treatment of pancreatic juice with 20 per cent. ammonium sulphate, the amylolytic ferment may be secured in what looks like a practically pure form, while with 30 per cent. the proteolytic ferment, and with 50 per cent. the lipolytic ferments are carried down. These remarkable results indicate that under certain conditions, which vary in each case, tetanus toxin and pancreatic ferments attach themselves to particles and thus become obtainable in nearly pure form. This discovery may mark a long step in advance in the study of toxins and ferments in general, the same principles no doubt being applicable to many other toxins and ferments than those mentioned.

[1] Reprinted from *The Journal of the American Medical Association.*

DILUTING FLUID FOR COUNTING BLOOD CORPUSCLES.[1]

JACOB DINER, MD., NEW YORK.

The need of a good diluting fluid for the purpose of counting blood corpuscles has often been impressed on me while working in the laboratory and in hospitals. Those mentioned in textbooks have many drawbacks. Some form a precipitate on standing; others while remaining clear do not permit of the addition of staining solutions so that the white corpuscles may be differentiated from the red corpuscles while making the count; still others destroy the red corpuscles if the diluted blood is permitted to remain in the counting pipette for some hours.

With the object in view of securing a fluid which will do away with the objections mentioned, I have done some work along this line and have obtained what I believe to be an ideal diluting fluid. This fluid permits of a simultaneous counting of white and red corpuscles; it keeps indefinitely without precipitating; it retains the normal shape of the corpuscles, and the diluted blood kept in the diluting pipette for over a week was as perfect as when first drawn. The formula is as follows:

Sodium chloride	0.85	gm.
Sodium citrate	2.00	gm.
Azure II	0.001	gm.
Formaldehyde solution, U. S. P.	3	drops.
Distilled water enough to make	100	c.c.

The sodium salts are dissolved in the water, the formaldehyde solution is added, the azure is added, and it is shaken well. It may be kept in any kind of a bottle.

The technic of using it is the same as with Toison's, Hayem's or any other fluid. The findings are computed according to the degree of dilution.

[1] Reprinted from *The Journal of the American Medical Association.*

THE DETECTION OF BLOOD IN THE URINE, FECAL MATTER AND PATHOLOGICAL LIQUIDS.

Thevenon, pharmacist aide-major, and Rolland, pharmacist auxiliary of the laboratory of the Military Hospital, Chambrey, propose a new procedure for the detection of blood in secretions and pathological liquids, based on the reaction with pyramidon in the presence of oxidants, the reaction being manifested by a violet coloration.

The reagents employed are:

1. Pyramidon ..... 2.5 Gm.
   Alcohol, 90 per cent..... 50 Cc.

2. Glacial acetic acid ..... 1 Cc.
   Distilled water ..... 2 Cc.

3. Solution of hydrogen dioxide of 12 volumes.

The mode of procedure for the detection of blood in urine is to take 3 or 4 Cc. of the unfiltered urine and an equal volume of the alcoholic pyramidon solution and 6 or 8 drops of the acetic acid solution; after agitating the mixture add 5 or 6 drops of the hydrogen dioxide solution.

In accordance with the quantity of the blood in the urine the coloration appears more or less rapidly; if there is produced immediately an intense violet lilac the blood present is abundant

The reaction usually takes place in about a quarter of an hour if there is present even traces of blood; the blue-violet tint attains a maximum intensity and then gradually disappears.

For the examination of fecal matter, a small quantity of the fecal matter is rubbed up with 3 or 4 Cc. of distilled water and filtered, the filtrate is then mixed with the pyramidin and acetic acid reagents and then 6 drops of the solution of hydrogen dioxide is added. In the presence of blood, the blue-violet coloration is observed and this is more or less intense according to the amount of blood present.

For the detection of blood in gastric juice or in various pathological liquids the same technique is followed.

Concurrent experiments made with the Meyer reagent and with

the proposed test gave in all cases the same result. The authors claim that the pyramidon test is as sensitive and delicate as that of Meyer and that it is very simple and rapid and that because of the conservation of time and the definite results obtained it will prove serviceable in the clinical examination for blood in the different liquids of the organism.—Translation from *Annales des Falsifications et des Fraudes.*

G. M. B.

TREATMENT OF CORKS USED IN SOXHLET AND OTHER EXTRACTION APPARATUS.[1]

By T. J. Ward.

The difficulties which arise from the porosity of cork and the solubility of certain constituents of cork when used in extraction apparatus may be overcome in the following manner: Gelatin is soaked in cold water for five or six hours, the unabsorbed water poured off, and the gelatin warmed gently until it is melted, when one quarter of the volume of glycerol and two volumes of water are added.

The corks, which have previously been softened and bored, are completely immersed in the glycerol-jelly solution contained in a covered beaker, and heated on a boiling water-bath for two hours. They are then removed, the whole of the surface wiped with a cloth, the corks dried in a warm place for a few hours, and then used in a Soxhlet extraction apparatus for one hour.

Corks treated in this manner may be safely exposed to the vapour of ether, petroleum ether, benzene, carbon disulphide, and chloroform, but must not be used with solvents in the vapour of which water and glycerol are readily soluble.

The corks should be stored at the ordinary temperature away from any source of heat, as a warm, dry atmosphere causes them to shrink and harden.

Four corks, two of which were very porous, treated in the manner described, were used to connect the flask, Soxhlet extractor, and condenser, in a series of ether extractions. The jelly was then completely removed with hot water and the corks dried at the ordinary

[1] Reprinted from *The Analyst.*

temperature, after which a further series of extractions was made. The extraction in all cases lasted for one hour.

The following results were obtained:

		Mgrms. of Ether-soluble Matter extracted	
	Extraction.	Corks A and B (very porous).	Corks C and D.
After treatment with glycerol jelly..	1	5	1
	2	0	0
	3	0	0
	4	0	0
After removal of glycerol jelly	5	13	7
	6	10	3
	7	7	9
	8	7	6
	9	8	5
	10	6	3

DISTILLATION OF GERANIUM OIL IN INDIA.[1]

In a recent issue the *Indian* (Government) *Trade Journal* quotes from a note on the distillation of geranium oil in the Nilgiris prepared by the chemical adviser to the Forest Research Institute at Dehra Dun, in which it is stated:

The note is written for the information of those interested in the development of the essential-oil industry in the Nilgiris, to show that the cultivation of geranium would in all probability lead to good results, especially as its distillation could be combined with that of eucalyptus oil without incurring any additional expenditure.

True geranium oil is distilled from the fresh herb of several species of *Pelargonium,* chiefly *Pelargonium odoratissimum, P. capitatum,* and *P. roseum.* (The plant collected by the writer has been identified for him as *Pelargonium graveolens* L'Herit.) The geranium plants cultivated and used for distillation are generally varieties of these species which, however, do not correspond exactly with the wild plants. Ducellier states that the plant is cultivated in open fields in many parts of Algeria. It is also largely cultivated in the south of France, in Spain, in Italy, Corsica, Réunion and in Provence.

[1] Commerce Reports.

The oil occurs mainly in the flowers and in the green leaves. The stem, the leaves which have turned yellow, and other parts of the plant have no oil in them. The plants are gathered just before the opening of the flowers when the citron-like aroma begins to change into a rose-like scent. The whole plant is put into the still. Sometimes the distillers, in order to make the aroma finer, add a small quantity of rose petals, the distillate of oil from which is commercially known as rose-geranium.

The yield of oil is stated to vary with the locality and with the varieties used for distillation. The leaves of *P. odoratissimum* yield in France from 0.1 to 0.2 per cent. and in Corsica 0.125 to 0.166 per cent.; in Réunion the leaves of *P. capitatum* give 0.1 to 0.14 per cent. of oil. In Italy, it is stated, by careful distillation the flowers once gave 1.5 to 1.98 per cent. and the leaves 0.7 to 0.8 per cent. In Sicily, on the other hand, only 0.07 per cent. was obtained. The major portion of the geranium oil of commerce comes from Africa and Réunion.

The main constituent of the oil is geraniol, but citronellol is also present. In addition to the free alcohols, tiglic acid esters, together with small quantities of caproic acid esters, are also present. Traces of acetic. butyric, and valeric acids have also been detected. The oil has 60 to 70 per cent. of the geraniol and 15 to 25 per cent. combined geraniol in the form of esters. Schimmel & Co. report the presence of linalool, one of the amyl alcohols, pinene, and phellandrene. Pure geranium oil is soluble in three times its volume of 70 per cent. alcohol, which is a very reliable test for the detection of turpentine and fatty oils.

The geranium is propagated in Algeria by cuttings, but it is not necessary to renew the plantations every year, as is done in the south of France, for the climate of Algeria is rather warmer and the plants are therefore not killed by frost in the winter. It is said that in Mitidja the plant sometimes attains an age of twelve years. It often happens that the plant is in leaf throughout the year, but there are occasions in Algeria also when the geranium plantations suffer severely from frost. In the South of France the pelargonia are treated as annuals; that is to say, every spring the fields are planted with fresh cuttings, which have been collected during the autumn and left to winter in protected spots. In the south of France there is only one crop yearly—in the autumn; but in Algeria

three crops are gathered every year. In the south of France it is necessary to have recourse to intensive culture by irrigation and rich manuring in order to make the single crop pay. In Algeria the flowers are cut for the first time in early spring; the second cutting is in June; and the third, if any, in October and November.

Five hundred pounds of the plant, consisting of the entire stem with leaves and flowers, containing 56 per cent. of moisture, were distilled. Only 3.5 ounces, or 0.044 per cent., of water-free filtered oil were obtained. Considering the season in which the plant was collected the yield was satisfactory, and it will be safe to assume that the Nilgiri geranium is normal in its oil-content. Further experiments on these lines must, however, be made before we can be said to have got full and sufficient data on the subject, and this can only be done if the cultivation of the plant is taken in hand.

It is recommended that its cultivation be encouraged in the Nilgiris as an auxiliary crop for the use of eucalyptus distillers. The climate of Ootacamund is well suited for its cultivation. The Nilgiri plant yields an oil of excellent aroma, having 46.60 per cent. of free geraniol and 28.19 per cent. of combined geraniol, for which a sale can be readily found even in India.

THE CHEMISTRY OF THE DUBOISIAS.[1]

The plants which are classified by botanists in the family Solanaceæ frequently contain substances possessed of powerful pharmacological qualities. Mention may be made of the mydriatic alkaloids of the atropine group and the active principles of the nicotine series. The number of substances classified in the atropine group was at one time numerous, but better methods of purification have led to the separation of some uncommon bodies into two or more well-known alkaloids. The chief members of this group are hyoscyamine, scopolamine and nor-hyoscyamine.

Hyoscyamine is an optically active alkaloid, of which the lævo-variety occurs naturally. This optical isomer is powerfully mydriatic. Atropine is the racemic form of this substance, and is readily made by shaking the lævo-variety with a little alkali. Such atropine as is separated from plants is believed to be due to the racemization

[1] *Medical Journal of Australia.*

of l-hyoscyamine during the isolation of the alkaloids. The dexter-isomer has been prepared synthetically, and is devoid of mydriatic properties. Atropine has about one half of the activity of the lævo-isomer on the eye, as it is made up of equal parts of the two isomers. Scopolamine, which is known commercially as hyoscine, is also an optically active substance. The natural variety is lævo-rotary, while the inactive form is readily prepared by racemization. The lævo-variety is more powerful pharmacologically than the dextro form.

Nor-hyoscyamine is chemically isomeric with hyoscyamine, but differs from it in the arrangement of certain groups. The name nor-hyoscyamine was given by Merck, and solandrine was given by Dr. J. M. Petrie, who isolated this alkaloid from *Solandra lævis*. Its pharmacological action has not been described, but experiments made in the University of Sydney show that it behaves like atropine.

Among the plants of the Solanaceæ growing in Australia are three species of *Duboisia*. *Duboisia myoporoides* is an evergreen tree, ranging through the coastal district of eastern Australia from Cape York to the Shoalhaven River. In 1877 Bancroft, of Brisbane, published an account of the action of aqueous extracts of the leaves of this tree. He paid much attention to the mydriatic properties of these extracts, which were used in ophthalmic practice in Brisbane. Bancroft took several pounds of the extract to England in 1878. Gerrard separated the alkaloid in a purer state from this material, and concluded that it differed from atropine. Ringer and Murell observed the dilatation of the pupil of the eye, the arrest of the perspiration, the antagonism to muscarine, the production of tetanus in frogs and the onset of headache and of drowsiness in man. They believed the new alkaloid to be different from atropine. Ladenburg obtained the crystalline gold chloride of hyoscyamine and from a commercial sample of duboisine sulphate. Some years later, from another sample, Ladenburg prepared the gold salt of scopolamine. In 1892 E. Merck isolated a new alkaloid, which he named pseudo-hyoscyamine. In 1912 Carr and Reynolds obtained from *D. myoporoides* 1.1 per cent. of hyoscyamine and 0.15 per cent. of nor-hyoscyamine identical with pseudo-hyoscyamine. Dr. J. M. Petrie recently examined a sample of duboisine sulphate belonging to the physiological laboratory of the University of Sydney. It yielded l-hyoscyamine, l-scopolamine and nor-hyoscyamine.

In 1860 Baron von Mueller described *Duboisia hopwoodii* from specimens brought back from the Burke and Wills expedition. Bancroft obtained in 1872 samples of the "pituri," which was used by the aborigines of the interior as an intoxicant. Mueller and Bailey identified "pituri" with *Duboisia hopwoodii* in 1876. Langley and Dickenson in 1878 showed that pituri was closely similar to nicotine in its physiological properties. Gerrard isolated the alkaloid, and named it piturine. Petit, of Paris, in 1879, identified piturine with nicotine. Professor Liversidge examined the alkaloid a year later, and concluded that it differed from nicotine in the amount of nitrogen present. In 1910, however, the late Dr. Rothera, of Melbourne, proved conclusively that piturine was identical with nicotine.

In 1867 Mueller described *Duboisia leichardtii* from material supplied by the explorer Leichhardt. This plant is a Queensland species, growing in the area between that occupied by *D. myoporoides* on the coast and by *C. hopwoodii* in the center of Australia. Dr. J. M. Petrie has found the fresh leaves to contain 0.28 per cent. of mixed alkaloids. From half a gramme of mixed alkaloids he has separated 0.1 Gm. l-hyoscyamine, 0.1 Gr. l-scopolamine, and 0.2 Gm. nor-hyoscyamine. Now that accurate information is available as to the distribution of these valuable medicinal substances in native trees, it is to be hoped that chemical enterpise and manufacturing ability will bring about the supply of these substances to the medical profession and to the public from Australian soures.

INDIAN FOREST PRODUCTS.[1]

Mr. R. S. Troup, assistant inspector-general of forests, has written a very useful and interesting pamphlet on the work of the Forest Department of India, in which he describes in a popular manner the main facts connected with the development of forest products generally. After dealing with the history, area, classes, and types of forests, research organization, etc., Mr. Troup passes on to a description of the forest products themselves, these including gums, resins, barks, leaves, fruits, fibers, etc., all of which fall under the head of "minor produce." The timber-trees are, of

[1] Reprinted from *The Chemist and Druggist.*

course, "major produce," and a paragraph is devoted to each of the principal, the following being typical of those of interest to the drug-trade:

Acacia Catechu Willd.—The cutch-tree. A moderate-sized to a large tree, common in most of the drier parts of India and Burma; grows gregariously on the shingly and sandy beds of streams in the sub-Himalayan tract. . . . Cutch and kath are obtained by boiling down chips of the heartwood. Supply largely utilized, especially in Burma.

Acacia arabica Willd.—Babul. A moderate-sized to large tree of the drier parts of the plains of India, chiefly in Sind (on tracts irrigated by the Indus), the plains of the Punjab and United Provinces, and the Indian Peninsula generally. . . . Bark used for tanning, pods for cattle-fodder and tanning; also yields a gum. Present supplies generally fully utilized; heavily worked since the outbreak of war for the tanning industry.

Dipterocarpus turbinatus Gaertn. f. Gurjan.—A very large evergreen tree of Burma, the Andamans, Chittagong, and Cachar. . . . The tree yields a wood-oil known as gurjun oil.

Pterocarpus Marsupium Roxb.—The gum-kino tree, bijasal. A large tree of central and southern India, extending north to Oudh and the Kumaun Bhabar. Wood yellowish brown, with darker streaks, very hard, durable; used for door and window frames, posts, beams, furniture, agricultural implements, wheels, carts, boats, and many other purposes. The wood when damp is apt to produce a yellow stain. The tree yields a red astringent medical gum known as "kino" from wounds in the bark. Fairly fully utilized where accessible.

Santalum album Linn.—Sandalwood. A small tree of the India peninsula from the Nasik and Nagar districts southwards, particularly in Mysore, Coorg, and some of the Madras districts—N. Coimbatore, N. Arcot, N. Salem, Bellary, and the Nilgiris. The heartwood is yellowish brown, hard, very close-grained, and strongly scented; it is used for carving and fancy work of all kinds, and is burned as incense, while sandalwood oil is distilled from it. Volume for volume, this is by far the most valuable wood in India; it is sold by weight, and every portion of the tree which yields heartwood of any size is utilized, the heartwood from the roots being the most valuable. Fully utilized.

The forests of India are so rich in minor products of all kinds that only those of proved commercial value are dealt with by Mr. Troup. As regards oil-seeds it is interesting to note that the best known obtained from any Indian tree is that of the mohwa, *Bassia latifolia,* which is used in India primarily for adulterating ghee, besides being exported to Europe in large quantities; thus, in 1913–14 the total exports amounted to 665,979 Cwt., valued at 364,000 l., of which quite 95 per cent. found its way to Germany, but since the war much of the trade has been diverted to England via Bombay. Many of the forest oil-seeds are utilized to a large extent as food and for cooking in India, but as a rule the seeds collected from trees scattered over large areas do not compete with oil-seeds cultivated as agricultural crops, and their collection is only commercially remunerative if they possess special properties, *e. g.*:

The seeds of Taraktogenos Kurzii yield the true chaulmugra oil of commerce . . . the tree is fairly common in Assam, the seeds being exported from the Khasi Hills and sold in Sunamganj. It is also common in the Sylhet and Sibsagar divisions of that Province, while considerable quantities are available from the Rangoon and Shwegyin divisions of Burma. A very similar oil, which is also a variety of chaulmugra oil, is obtained from the seed of *Hydnocarpus Wightiana,* which is found in the forests of the West Coast, especially in South Malabar and in the Cochin and Travancore States.

The forests of India are rich in undeveloped tanning materials, and there is unquestionably a great opportunity for technical research as well as for industrial and commercial development. The study of tanning materials is being steadily prosecuted at the Forest Research Institute, and with the object of inquiring into the commercial possibilities of preparing tan and extracts, the government of India have recently secured the services of a tanning expert from England. Among those described are myrabolans, babul bark and pods, mangrove-barks, *Cassia auriculata* (the standard tan-bark of southern India), leaf tans or sumach, cutch, etc. Among the essential oils described by Mr. Troup prominence is given to sandalwood, rosha (east Indian geranium or palmarosa oil), and lemongrass. There is nothing new to be said about sandalwood, except that the hope is expressed that " the time is not far distant when the whole output of sandalwood required for distillation-purposes

will be distilled in India by modern methods, and not exported for distillation abroad." In regard to palmarosa oil, which was dealt with in the C. & D. of July 14, 1916 (p. 787), recent investigations have shown that improvements in distillation can be effected by employing a modern type of steam still, and that by distilling the grass with steam 20 per cent. more oil can be obtained. In regard to wintergreen oil, Mr. Puran Singh, chemical adviser at the Forest Research Institute, is believed to have been the first to show that the oil can be distilled at a profit in India from the leaves of *Gaultheria fragrantissima* collected in Assam during the winter, the fresh leaves giving as much as 0.65 per cent. of oil, or 1.2 per cent. calculated on the dry material. Naturally Mr. Troup gives a detailed account of the Indian pine-resin industry, to which much attention has been devoted of late years, and, judging from his remarks, there is no doubt that eventually India will be able to supply the greater part of her own markets with rosin and turpentine oil.

THE MANUFACTURE OF ANTHRAQUINONE.[1]

There is a growing feeling that our American color industry should promptly enter upon the manufacture of alizarin and the other important dyes derived from anthraquinone. In this connection we reproduce from *La Revue Produits Chimiques* a full account of the current process, now employed in Europe, for transforming the hydrocarbon anthracene into anthraquinone:

By oxidation anthracene yields anthraquinone according to the equation:

$$C_{14}H_{10} + 3O = C_{14}H_8O_2 + H_2O.$$

As this oxidation is effected industrially by means of chromic acid it may be formulated as follows:

$$C_{14}H_{10} + Na_2Cr_2O_7 + 4H_2SO_4 = C_{14}H_8O_2 + Cr_2(SO_4)_3 + Na_2SO_4 + 5H_2O.$$

It is performed in large wooden vats, lined with lead, holding 10 to 12 cubic meters. The vats are heated with direct steam and furnished with agitators. A vat is charged wtih sublimed anthracene, still in form of paste. The charge is 150 kilos of anthracene to

[1] Reprinted from *The Chemical Engineer.*

3,000 to 4,000 liters of water. The temperature is raised to 75° C., and, with constant stirring, 2,000 liters of a chromic solution, containing 100 grammes of chromic acid and 250 to 300 grammes of sulphuric acid at 66° Bé. per liter, are added gradually. The 2,000 liters, therefore, contain 300 kilos of bichromate of soda and 600 kilos of sulphuric acid. During the operation the temperature gradually reaches 95° C.

The oxidation is carried on for twelve to sixteen hours, and does not present any particular difficulties. The chromic acid must not be added too quickly, and the solution must not be too concentrated. Otherwise a persistent and troublesome foam is produced. The reaction is controlled, from time to time, by testing samples. A sample is filtered, washed, then sublimed over the naked flame in a small test-tube, and, with a little practice, it is easy to see if the anthraquinone is pure or whether, on the other hand, there is still anthracene present. The anthraquinone sublimes in fine needles, whereas anthracene forms silvery scales, easily recognizable.

It will be seen by the proportions given that the bichromate is employed in excess; 200 kilos of bichromate, theoretically, should be able to oxidize 175 kilos of 95 per cent. anthracene.

When the oxidation is terminated the contents of the vat are forced by a pump through a filter press, in which the anthraquinone is thoroughly washed. If the anthracene used is sufficiently pure, the yield is about 110 per cent. of anthraquinone.

The anthraquinone thus obtained is sublimed by steam in an apparatus similar to that used for anthracene. On the sublimation the weight is reduced; the theoretical 117 per cent. falls to about 80 to 85 per cent.

Formerly, when non-purified anthracene was oxidized, the anthraquinone obtained was very impure, and had to be treated with two or three times its weight of sulphuric acid (66° Bé.) at 100° C., until a sample poured into water gave an almost white precipitate. By this treatment the impurities became soluble in water, whereas the anthraquinone, being insoluble, could be separated out. Since purified anthracenes have been obtainable, this operation has disappeared, sublimation alone being generally sufficient to bring the anthraquinone to a sufficiently pure state for ordinary purposes. The sulphuric acid treatment is still resorted to, however, in the rare cases when an extremely pure anthraquinone is required.

Anthraquinone forms yellow crystals. In a finely divided state it is almost white. The fusing point is 284.6° C., the boiling point 382° C. It sublimes very easily. It is completely insoluble in water, slightly soluble in alcohol, ether, and benzene in the cold, rather more soluble with heat in benzene and in glacial acetic acid.

It is not a commercial product. Apart from a limited use as catalyzer in certain sulphoxylate discharges, it is employed solely in the color works.

It is interesting to note that it may be synthesized without using anthracene as the point of departure. Phthalic acid is condensed with benzene in the presence of chloride of aluminum. This gives orthobenzoyl-benzoic acid. By anhydrization with hot concentrated sulphuric acid this gives anthraquinone. The reaction is so simple that its industrial application has been considered. As a matter of fact, although it has not been used for anthraquinone itself, it is employed in the synthesis of different derivatives of anthraquinone.

A very important factor in the economy of anthraquinone manufacture is the regeneration of the chrome, which, after oxidation, is in the state of chromic sulphate. This can be crystallized and recovered in the form of chrome alum, after the addition of the necessary quantity of sulphate of potassium or of sulphate of ammonium, as the ammonia alum crystallizes as well as the potash salt.

The high price of chrome alum, which is very largely used at the tanneries, makes the recovery of importance. An annual production of 300 tons of anthraquinone nearly corresponds with the French consumption, and in the manufacture 1,500 tons of chrome alum are obtained.

Another way is to precipitate the chromic sulphate with soda, which gives chromium hydroxide used in the preparation of chromium acetate, chromium fluoride, and other salts used in the textile industries. In the German works the chromic acid is recovered by electrolysis, which is by far the most economical way where the electric current is cheap.

Uses.

Except for certain special purposes, anthraquinone serves almost solely as the raw material for the anthraquinone colors, of which alizarin is the most important. By sulphonation, nitration, chlori-

nation, and other processes nitro-anthraquinone, sulpho-anthraquinone, chloro-anthraquinone, amido-anthraquinone, etc., are prepared, and these serve as intermediaries for the manufacture of a large variety of valued dyes.

CHARLES H. LAWALL, PH.M.

PRESIDENT-ELECT OF THE AMERICAN PHARMACEUTICAL ASSOCIATION.

Charles H. LaWall, associate professor of theory and practice of pharmacy in the Philadelphia College of Pharmacy, has been elected president of the American Pharmaceutical Association for the year 1918–1919.

Charles Herbert LaWall was born at Allentown, Pa., on May 7, 1871. His father was John J. LaWall, likewise a druggist, and who for some years had a store in that city.

In 1876 John J. LaWall accepted a responsible position with the drug firm of Moyer Brothers, engaged in the retail, jobbing and manufacturing of pharmaceuticals at Bloomsburg, Columbia County, Pa., and his family was removed to that locality.

The early education of Charles H. LaWall was obtained in the public schools and in the Bloomsburg State Normal School. In the latter his instruction embraced physics, chemistry, higher mathematics, including trigonometry, Latin, and German. In July, 1888, he engaged with the firm of Moyer Brothers to learn the drug business, and served with them an apprenticeship of three years.

He came to Philadelphia and matriculated as a student in the Philadelphia College of Pharmacy in September, 1891, and was graduated in 1893.

While attending the college, he was in the employ of Smith, Kline & French Co. After graduating he was engaged for some time in a retail store in Atlantic City. In 1894, he returned to Philadelphia and accepted a position in the analytical department of Smith, Kline & French Co.

He has been a close student, a keen observer, an accurate investigator, always making the best of his opportunities and assiduously enlarging the scope of his work and broadening his influence. He has taken a lively interest in the state and national pharmaceutical associations, and his numerous contributions to the literature of pharmacy prove that his pen, as well as his intellect, has

been kept busy. Despite these activities along chemical and pharmaceutical lines, he has found time to take up the practical study of systematic botany and his recreation has been found in numerous botanical excursions and as a result he is well informed upon the local flora.

Professor LaWall has devoted his energy largely to the study of practical assaying, and now enjoys an established reputation as practical chemist. In 1903, he became associated with Dr. Henry Leffmann in analytical work in his laboratory, and has since acquired the business and succeeded Doctor Leffmann in commercial work. In August, 1904, he was appointed chemist to the Department of Agriculture of Pennsylvania, which position he has since continuously held. As a chemist for that state he has made numerous examinations and exposed many frauds and adulterations in foods and drugs. In April, 1907, he was appointed as inspection chemist of the United States Department of Agriculture having charge of the examinations of drugs coming into the port of Philadelphia.

In addition to his many papers contributed to the journals, Professor LaWall was associated with Doctor Leffmann in the publication of a text-book on organic chemistry which appeared in 1905.

He received the degree of Master in Pharmacy in course from the Philadelphia College of Pharmacy in 1905, and the same year, was made associate professor of theory and practice of pharmacy in this college.

EXEMPTION OF CHEMISTS FROM MILITARY DUTY.[1]

In the inevitable haste required to organize the selection of the great army of American youth, now in training, and soon to be found on the firing line in Europe, we have not adequately profited from the experience of England and France. There, also, in 1914 was seen the same hurry to bring together, with the least possible delay, every man capable or willing to carry a rifle. Ere long it was recognized that the engineer, the electrician, the chemist, and others of high scientific training could render far greater service to the cause of national defense at home than in the trenches.

Then came the period, unfortunately after many had fallen,

[1] Reprinted from *The Chemical Engineer.*

when they were gradually summoned back to deal with a multiplicity of problems of prime importance. Chemists in particular were required to handle all the questions involved in assuring an enormous output of explosives of every form, in combating the use of gases in warfare, in establishing the manufacture of drugs and general chemicals formerly secured from the enemy and in producing rapidly a host of articles essential for modern warfare.

On this side of the ocean there has been a tardy issue of regulations, exempting medical students and hospital internes. There has been, however, no action tending to free chemists from the action of the draft and save to the most vital industries of the land the men whose knowledge and training, now or later, will be of incalculable value for national defense or for preserving the integrity of our industrial fabric.

Dr. Wm. H. Nichols, chairman of the Committee on Chemicals of the National Research Council, has given this matter much thought in connection with his colleagues. At the recent meeting in Boston of the American Chemical Society he made the following forcible statement in depicting the activities of his committee:

"One of our most serious difficulties arises from the unwillingness of the military authorities to recognize the wisdom of exempting chemists as a class from the draft. Almost from the beginning of our work we took up this question from various angles, realizing as we do the vital importance of keeping chemists at work in their profession, not only at the present time, but more particularly for the future. Our civil, mechanical, electrical and other engineers can be made good use of at the front, and not only contribute greatly to the success of our forces, but by the valuable experience obtained in their profession can improve themselves for future service at home. This is not true of chemists, with an exception here and there. Once in the army and at the front, if he be only recently out of college, he is lost to chemistry forever. They are not slackers and are just as anxious as any other red-blooded young men to get into the fray, and therefore I have believed it wise not only to have them exempted from the draft but declined in case they should enlist. Already serious trouble has come to many of our chemical plants and plants employing chemists, as a result of the draft, and unless wise provision be soon made we can foresee a condition which it will cost months to rectify. Why should we not

take advantage of the experience of our English friends who have passed through this same situation, and learned that there is a large class of men who can do more valuable work behind the lines than they can in the trenches?"

MEETING OF THE NATIONAL PHARMACEUTICAL SERVICE ASSOCIATION.

Three hundred and forty-five new members were added to the roll of the National Pharmaceutical Service Association at its seventh monthly meeting held at the Philadelphia College of Pharmacy, Tuesday evening, December 11.

Dr. Henry P. Hynson of Baltimore, who had been invited to speak on the organization of a Pharmaceutical Corps in the Army, stated that there were two ways open to pharmacists for securing such a corps. One was to induce the medical profession and the Surgeon-General's office to favor such a measure, and the other was to have a bill similar to the Edmonds Bill passed by Congress over the head of the Surgeon-General. Dr. Hynson told of his connection with the Rotary Clubs and of the coöperation that could be afforded the movement for the passage of the Edmonds Bill by Rotarian pharmacists. Dr. Hynson said that he would make it his first "order of business" to secure the coöperation of Rotary Clubs throughout the United States in behalf of the Edmonds Bill. He also mentioned the desirability of having the support of the National Drug Trade Conference in pushing this measure through Congress.

Mr. Caswell A. Mayo, of New York, who had also been invited to speak on the Edmonds Bill, made a very interesting address based on his experiences in the various camps which he has had an opportunity to visit. He declared that it was absolutely necessary for the welfare of our Army to have adequate pharmaceutical service and urged that subscriptions be asked for so as to swell the funds of the N. P. S. A. sufficiently to be able to carry on an active propaganda in behalf of the measure. It was moved, seconded and carried that the secretary send out letters asking for contributions for this work and it was also decided that the Executive Committee be instructed to prepare literature telling of the work of the N. P. S. A.

Upon motion by Dr. Eberle it was decided to ask the National Drug Trade Conference and other associations for their active co-operation in this work.

A hearty vote of thanks was given Mr. Mayo and Dr. Hynson for their attendance at the meeting and for the messages which they had brought.

DEATH OF KENNETH HAY.

The first reported death of a student of the Philadelphia College of Pharmacy, who in this war has entered the service of his country, is that of Kenneth Hay, son of the late Charles F. Hay, of Dubois, Pa., a prominent Pennsylvania pharmacist. Kenneth Hay matriculated in the College in 1916, shortly after the death of his father, and sustained the additional loss of his mother shortly after entering College.

When war was declared with Germany, Mr. Hay enlisted as an orderly in Base Hospital No. 10, sent by the Pennsylvania Hospital of Philadelphia. His death was reported in one of Gen. Pershing's official casualty lists for November, the cause ascribed being appendicitis and pneumonia.

CURRENT LITERATURE.

SCIENTIFIC AND TECHNICAL ABSTRACTS.

CITRIC ACID FERMENTATION OF ASPERGILLUS NIGER.—In the citric acid fermentation of sucrose by *Aspergillus niger* the mycelium floats on the surface of the substratum and wrinkles up in such a manner as to present a very large surface of contact. These wrinkled structures often project 5–6 Cm. into the medium and exhaustion of the substratum proceeds under very favorable circumstances. By a judicious selection of cultures and conditions the yield of citric acid can be varied from nil to over 50 per cent. of the sugar consumed. Conditions especially favorable to citric-acid formation are low nitrogen supply, high concentration of sugar, and the use of ammonium salts instead of nitrates. As regards the reaction of the medium, the hydrogen-ion concentration is a far more important factor than the titratable acidity. For a given hydrogen-ion concentration (p^h) a mineral acid, such as hydrochloric, is less toxic than an organic acid. The addition of calcium carbonate is disadvantageous rather than helpful; the cultures readily produce a solution of 10 per cent. citric acid and the limiting hydrogen-ion concentration is exceptionally high. Fermentation can be started at a hydrogen-ion concentration, which will greatly reduce the chance of infection without interfering with the growth. Higher yields in a shorter time are obtained without calcium carbonate than with it, as the carbonate partially precipitates the magnesium and phosphate nutrients; moreover the formation of calcium citrate is a hindrance in recovering the citric acid. It is possible to ferment two or three batches of medium in succession with the same mycelial felt by draining off the liquid and running in a fresh batch. The most suitable medium for conducting the citric acid fermentation has the following approximate composition per liter: Sucrose, 125–150 Gms.; ammonium nitrate, 2.0–2.5; potassium dihydrogen phosphate, 0.75–1.0; crystallized magnesium sulphate, 0.20–0.25 Gm.; hydrochloric acid to $p^h = 3.4$–3.5 (5–4 Cc. of $N/5$ acid). The use of this quantity of hydrochloric acid makes it possible to sterilize the liquid completely by steaming at atmospheric pressure for 30 mins. and prevents subsequent infection without interfering with the fermentation. In a medium of this nature there is little development of

acid in the first 2 or 3 days; when a vigorous mycelium has developed the rise in acidity is very rapid—about 2 per cent. in twenty-four hours—until the seventh or eighth day. After remaining constant for 2 or 3 days the acidity begins to decline. In a proper fermentation the fungus does not produce spores but remains white. Under favorable conditions the acidity will reach 10–12 per cent. on the eighth day; oxalic acid may amount to 3–4 per cent. of the total acidity. Fermentation may be carried out successfully in shallow pans and the liquid pressed out from the mycelium in a filter-press. (Through *Journal of the Society of Chemical Industry.*)

Comparison of Methods for the Estimation of Glycyrrhizin in Liquorice Root and in Succus Liquiritiæ.—It is only within the last ten years that the importance has been emphasized, rightly, of estimating, in addition to the glycyrrhizin, the amount of sugar, in order that adulteration of a liquorice with sugar may be detected. Since the amount of glycyrrhizic acid (glycyrrhizin) varies between wide limits, not only in different kinds of liquorice, but even in one and the same kind at different times, the author used always the same liquorice throughout his series of comparative experiments on the trustworthiness of the twenty-seven methods proposed for the estimation of glycyrrhizic acid. In any method, attention must be given to the following points: (1) The influence of the liquid employed as a solvent of the liquorice; (2) the nature of the acid used as the precipitant; (3) the solubility of glycyrrhizic acid in water and in the precipitant, and the loss caused thereby; and (4) the purity of the glycyrrhizic acid when brought to the stage of weighing. All the methods are criticized from these four points of view, and the author draws the conclusion that no one of them is really trustworthy, mainly on account of the impossibility of isolating the glycyrrhizic acid in a pure state. Details are given of a method proposed by the author, which, although tedious and not strictly trustworthy, is less inaccurate than any other previously brought forward. A tabulated list of the literature on the subject from 1808 to 1913 is given, together with a classified list of the results obtained by the twenty-eight methods discussed in the paper. (A. Linz, *Arch. Pharm.*, 1916, 254, 65–134, 204–224, through *J. Chem. Soc.*, 1917, 112, II, 430–431, and reprinted from *The Analyst.*)

SOLUBILITY OF CALCIUM CARBONATE IN BOILING WATER.—Various statements have been published of the solubility of calcium carbonate in water at 100° C., as, for example, 0.111 Gm. (Fresenius), 0.143 Gm. (Pollacci), 0.034 Gm. (Hofmann), and 0.036 Gm. (Weltzien) per liter. The author's experiments show that this discrepancy is due to the fact that calcium carbonate is slowly dissociated by boiling water, with the loss of carbon dioxide. For this reason it is not possible to obtain a solution containing only calcium carbonate in boiling water. This dissocation does not continue indefinitely, and may be checked by adding to the boiling water in which the calcium carbonate is suspended about 15 Cc. of a solution of lime (saturated at the ordinary temperature). The substance found in the solution after long-continued boiling of calcium carbonate with water consists almost entirely of free lime. Apart from the duration of boiling, other factors which have an influence upon the proportion of free lime which dissolves are the volume of the liquid and the concentration of the solution. The addition of a small quantity of sodium carbonate prevents the dissociation and the solution of calcium carbonate in boiling water. Advantage may be taken of this in estimating calcium in the form of carbonate. The precipitate is washed with boiling water containing 0.05 Gm. of anhydrous sodium carbonate per liter. It is then treated with standard hydrochloric acid until completely dissolved, and the excess of acid titrated with standard sodium hydroxide solution, with methyl orange as indicator. The error due to the sodium carbonate solution retained by the precipitate (about 2 Cc.) is negligible. Calcium carbonate produced by chemical reactions in aqueous solutions at low temperatures forms supersaturated solutions, the stability of which depends mainly upon the concentration and the temperature. (A. Cavazzi, *Gazz. Chim. Ital.*, 1917, 47, 49–63. Reprinted from *The Analyst.*)

PURE BISMUTH.—The determination of minute traces of impurity in bismuth is difficult, since the basic salts form amorphous precipitates which obstinately retain other metals, as also do the sulphide and oxide. The electrolytic method of separation also fails. The best means of obtaining the pure metal is by crystallizing the normal nitrate from strong nitric acid. Fairly pure bismuth nitrate is dissolved in half its weight of 8 per cent. nitric acid, and the solution

mixed with an equal weight of the strong acid. The crystals which separate at 0° to 10° C. are washed with ice-cold nitric acid. The pure nitrate is converted into oxide by heating and this is reduced by fusion with potassium cyanide. Further purification is effected by melting the metal under paraffin, and removing, by means of a glass spoon, the first, and purest, crystals formed. Purified bismuth melts at 271° C., and when pressed into wire the melting point is lowered to 195° C., and its specified electrical resistance is then 1.20. Various samples of bismuth sold as pure were found to contain from 0.03 to 0.25 per cent. of impurities. The method for testing for impurities is detailed. (F. Mylius and E. Groschuff, *Zeit. Anaeq. Chem.*, 1916, 96, 237, through *J. Chem. Soc.*, 1917, 112, (3), 37.)

Biochemical Reaction to Differentiate Pyrocatechol, Hydroquinone and Resorcinol.—The reaction is based on the property of the enzyme laccase of developing a blue color with certain phenols in presence of free hydriodic acid and starch. The reaction occurs in two phases. In the first loss of phenolic hydrogen occurs as the result of oxidation. In the second, much more sensitive, the hydriodic acid is reduced, deprived of its hydrogen, and iodine is liberated. The reagents necessary are: (1) 1:50 solution of soluble starch, containing 3:100 of potassium iodide; (2) glycerin maceration of *Russula delica* 1:1, or other fungus rich in laccase. A little of this is filtered through cotton wool when required. On adding 2 drops of this to 2 Cc. of a 1:1,000 solution of pyrocatechol, then 5 drops of the starch solution, followed by 1 to 3 drops of a 6:100 solution of acetic acid, an intense blue color is gradually produced. On repeating the test with a similar solution of hydroquinone no reaction occurs. But, on substituting a 4.9:100 solution of sulphuric acid for the acetic acid, a blue color will gradually appear. With resorcinol, under similar conditions, a negative reaction is obtained with either acid. The reaction, therefore, serves easily to distinguish these three isomeric diphenols. (J. Wolff, *Annales de Chim. Analyt.*, 1917, 22, 105, through *The Pharmaceutical Journal and Pharmacist.*)

The Chemical Structure of Nucleic Acid.—The bustle of a busy world, particularly in war time, is likely to leave us oblivious

to the beauty or the importance of happenings which do not show on the surface their direct application to everyday affairs. Yet even a brief consideration of the fundamentals of such modern necessities as the dynamo, the wireless, the coal tar dyes or the antiseptics, will carry us back to the little heralded research of some quiet investigation in a modest laboratory. In a spirit of dutiful recognition of important contributions of this sort we cannot refrain from reference to a series of investigations on the chemical structure of the nucleic acids, culminating in recent papers from the laboratory of physiologic chemistry at the Johns Hopkins University. To the biologist the nucleic acids are familiar as integral components of every nucleated cell in living beings; to the physician they further recall the purins, which play a part in the genesis of uric acid. Recent studies have definitely indicated that there are two distinct types of nucleic acids, one of which is found in animal tissues and the other in plants. Our knowledge of plant nucleic acids has been acquired from the study of products from two sources; the wheat embryo and yeast. It has now been ascertained that these plant nucleic acids are probably identical. They are composed of four mononucleotids (compounds of a nitrogenous substance either a purin or a pyrimidin, a carbohydrate and phosphoric acid) joined together through their carbohydrate groups. The details of such chemical structure would probably interest most of our readers as little as the intricacies of modern experimentation in the science of immunology on which much useful serum therapy has been based. No one will gainsay, however, that the unraveling of the structure of a compound represented by the empiric formula $C_{38}H_{55}N_{15}O_{29}P_4$ is no mean accomplishment. And to associate this splendid labor largely with the names of American investigators—Osborne, Wheeler, Johnson, Levene, Jacobs, Jones and others—lends a national pride to the accomplishment. (*The Journal of the American Medical Association.*)

DANDELION ROOT ADULTERANT.—Examination of samples of importations of "dandelion root," *Taraxacum officinale* Weber, has disclosed that in some instances roots obtained from a Lactuca species, very probably *Lactuca canadensis* L., or *Lactuca spicata* (Lam.) Hitche., have been substituted for the true material. The root of *Taraxacum officinale* may be distinguished by the concen-

trically arranged groups of laticiferous vessels and sieve tubes, which alternate with whitish inulin-bearing parenchyma. *Lactuca* root is characterized by its trachæ which are arranged in radial rows, usually one cell wide, alternating with medullary rays two or three cells wide. The department will recommend the exclusion from the United States of any shipment labeled "dandelion root," consisting wholly or in part of roots of *Lactuca* species. (*U. S. Department of Agriculture.*)

FENNEL ADULTERANT.—Examination of samples of "fennel seed," *Fœniculum vulgare* Miller, has disclosed that bitter fennel, *Fœniculum piperitum* Sweet, has been substituted in some instances for the true material. This species is not cultivated and may be distinguished from *Fœniculum vulgare* by its very much smaller size and the decidedly bitter taste and flavor of its volatile oil. The department will recommend the exclusion from the United States of any shipment labeled "fennel seed," consisting wholly or in part of bitter fennel. (*U. S. Department of Agriculture.*)

BIEBRICH SCARLET AS A STAIN.—Dr. A. Knyvett Gordon, of Virol Research Laboratories, writes to the *British Medical Journal* to point out the advantages of Biebrich scarlet as a plasma-stain. He states that in routine histological work it is customary and advantageous to use a "contrast" stain after the nuclei of the cells have been defined by hæmatoxylin or (in the case of chronic or sublimate-hardened material) by methylene blue. For this purpose eosin is commonly employed, but it has two disadvantages: (1) It not infrequently extracts the color from the previously stained nuclei; and (2) it colors everything else with the same intensity. Benzopurpurin is free from these drawbacks, but it is useless in weak solution, and in adequate concentration is apt to stain very unevenly and to deposit gelatinous flakes in portions of the section. Picrorubin (Van Gieson's stain), picroerythrosin, and similar preparations have the grave disadvantage of discharging the color almost completely from the nuclei after the preparation has been mounted for a short period. Biebrich scarlet is soluble in water freely, and is best used in 1 per cent. solution. It never overstains, and does not discharge the color from the nuclei. Most sections are stained sufficiently in two to five minutes. It does not wash out in alcohol, clove oil, cedarwood

oil, or xylol. Its chief advantage, however, is the fact that it stains different tissues with varying degrees of shade and tint. Muscle, for instance, is stained a yellowish-brown, and the protoplasm of young epithelial cells a bluish-pink, while the older keratinized cells are bright scarlet. In an epitheliona, for instance, the degree of pressure to which the epithelial cells have been subjected, which is a valuable guide to the rate of growth of the tumor, is well differentiated. Used after methylene blue for tissues that have been fixed in Flemming's or Zenker's fluid, it does not discharge the nuclear stain. The staining is of marked permanency. He adds that the dye is now being made by British Dyes, Ltd. (*From The Chemist and Druggist.*)

COMMERCIAL AND TRADE INTEREST.

ADEN'S EXPORTS OF SENNA LEAVES TO UNITED STATES.—Among the exports to the United States for the second quarter of the calendar year 1917, declared at the Aden consulate, those of senna leaves take a more prominent place than ever before in the history of American trade with Aden.

The local article of commerce known as senna consists of the leaves of some species of *Cassia* which grow wild in several parts of this commercial district. It is used for medicinal purposes. The native name is "senna makki." The supply in the Aden market consists chiefly of two kinds of grades, known as "Yemeni" and "Jibuti."

The Yemeni grade is much the better and comes to Aden from the Yemen and other Red Sea Arabian Provinces, while the second grade is collected in Abyssinia and French Somaliland, and is shipped from Jibuti to Aden.

Senna reaches Aden in large bales weighing from 12 to 16 maunds each (a maund is 28 pounds). Recent prices for the uncleaned senna have been 5 rupees and 8 annas ($1.78) per maund for the Yemeni, and 1 rupee less (a rupee equals $0.3244) per maund for the Jibuti grade. These prices are approximately 2 rupees higher than the normal figures.

The senna is cleaned in Aden. Indian women are employed to pick it over and throw out twigs, discolored leaves, etc. Leaves of other plants which resemble the senna leaves are often mixed with it in the districts of production to increase the weight. Consider-

able skill, therefore, is said to be needed by the women who do the cleaning, in order to find and throw out these foreign leaves. If rain falls while the senna is being sundried in the districts of production, the dried leaf turns black, and these also must be removed when the senna is cleaned for export. An uncleaned bale often gives less than half a bale of cleaned and picked product fit for foreign markets.

Only recently has it become an article of export to Europe and to the United States, although small quantities occasionally have gone to Egypt and to India. During the past 15 months a demand has developed in the United States, and the first exports of senna recorded at this consulate were shipped during the second quarter of 1916, when 31,273 pounds, valued at $7,946, were sent to American importers. During the third quarter of 1916, a small amount, valued at $1,613, went to the United States. The next shipments were made during the second quarter of the current year, and they amounted to 82,868 pounds, valued at $42,407. During this quarter senna leaves ranked next to skins in the value of Aden exports to the United States. American importers apparently are paying fancy prices for the product.

The total exports of all commodities to the United States during the second quarter of the current year reached a value of $869,609, which is about 70 per cent. of the total value of the exports during the first quarter of this year.—Consul Addison E. Southard, Aden, Arabia, July 2. (From Simmons's "Spice Mill.")

PEANUT-OIL MANUFACTURE IN UNITED STATES.—According to information collected during June, 1917, by the Bureau of the Census coöperating with the Bureau of Chemistry of the U. S. Department of Agriculture, there were fifty mills in the United States making peanut oil. During 1916, these mills produced over twenty-six million pounds, or about three and a half million gallons of peanut oil. In addition to this there was imported a little over two million gallons, making the total consumption of peanut oil in this country over five million gallons.

Abroad, practically all the edible peanut oils are made by pressing cold the shelled nuts, only the residue from these cold pressing being cooked and hot pressed. The third or fourth grades thus obtained generally have been used for technical purposes. In the

United States the tendency has been to treat peanuts the same as cotton-seed with the result that practically all the oil produced required refining or a least deodorizing before it was suitable for salad and cooking purposes. There is no reason why a large part of our domestic peanut oil should not be made from sound, shelled stock pressed in such a way as to yield a virgin oil which would be ready for household use when simply filtered to remove press sediment. At the present time there are mills willing to make this high-grade virgin oil if they can obtain a steady market at a price slightly above what is paid for the crude hot pressed oil. As in refining there is a loss of about 5 per cent., every hundred gallons of virgin oil produced means a saving of five gallons of food oil, which would otherwise go into soap stock. At this time of increasing scarcity of edible oils it is of vital importance to save at every point possible and if those who are in a position to create a market for this virgin peanut oil, which is generally considered superior to the refined article, will get in touch with the producers so that they will be assured of a demand for their product. The Bureau of Chemistry has a list of the mills that contemplate crushing peanuts this season and will be glad to coöperate with the wholesale grocery trade by supplying it with the addresses of firms in a position to furnish virgin peanut oil. (From Simmons's "Spice Mill.")

MEDICAL AND PHARMACEUTICAL.

THE CARREL-DAKIN TREATMENT OF WOUNDS.—A committee appointed by the director-general of the British Army Medical Services for the purpose of investigating and reporting on the Carrel-Dakin treatment of wounds has made its report (*British Medical Journal;* 1917, 2, 597). The hospitals visited were Carrel's, which at the time of the visit was under the surgical care of Guillot; the clinics of Tuffier and Churto in Paris; the American Ambulance in Paris, and Mrs. Depew's Hospital at Annel. In Carrel's, Tuffier's and Chutro's clinics, only Dakin's fluid is used. In the Annel Hospital, three fluids are used with Carrel's tubes—Dakin's fluid, eusol and ether. The committee was assured that good results were obtained from each of them. The committee points out that it is evident that in estimating the value of the Carrel-Dakin treatment, care must be taken to appraise quite separately the method of applying the antiseptic and the antiseptic employed. While con-

vinced that the use of Carrel's tubes, as the committee saw them employed, is a very valuable means of applying an antiseptic fluid to a wound, the committee is not satisfied that Dakin's fluid is markedly superior to eusol, and was prepared to find that other antiseptics can be used with advantage by the Carrel method.

The results of the Carrel-Dakin treatment, as seen in a large series of unselected cases, were remarkably good. The most striking evidence of the value of the treatment seen by the committee was a printed notice put up in a prominent place in Tuffier's wards, said to be the expression of his own opinion after a considerable experience of the Carrel-Dakin treatment. The notice is as follows:

"Tout blesse qui suppure a le droit d'en demander la raison a son chirurgien" (every patient whose wounds suppurate has the right to demand an explanation of his surgeon).

The committee is of the opinion that the Carrel-Dakin method of treament, if carried out thoroughly, is full of promise, and believes that it will (1) diminish the dangers incidental to sepsis, including secondary hemorrhage; (2) hasten the patient's convalescence; (3) lessen the liability to stiff joints and cicatricial deformities; (4) enable the patients to leave the hospital with better general health than they otherwise might, and that (5) when secondary operations become necessary, these operations are more likely to be free from septic complications than when some other system of primary treatment has been adopted. (From *The Journal of the American Medical Association.*)

Antityphoid Vaccination and Agglutination Test.—The total number of quantitative tests performed by Rist from February to November, 1915, amounted to 11,648. He found the greatest practical value for diagnosing infection caused by the bacilli of the typhoid group. But when it comes to discriminate between the three subspecies belonging to that group, the information given by the Widal test should be accepted with great caution. A predominance of the agglutination titer of *B. paratyphoid A* or *B* speaks almost certainly in favor of *B. paratyphoid A* or *B*. But if the agglutination titer of *B. typhosus* predominates, the probability of the disease being due to *B. typhosus* is only 73.3 per 100. In individuals having been previously vaccinated against *B. typhosus,*

the agglutination test is absolutely unable to confirm a clinical diagnosis of typhoid. The behavior of the agglutination titer in vaccinated typhoid or paratyphoid patients is not distinguishable from the behavior of the same titer in vaccinated individuals suffering from any other disease. In a case of clinically confirmed typhoid occurring in a previously vaccinated individual, the agglutination test has a practical diagnostic value whenever it shows a constant predominance of the agglutination titer for one of the paratyphoid germs. But this is a very rare finding. In the greater majority of cases the agglutinating titer for *B. typhosus* predominates. It has no diagnostic value, the probability of mistaking paratyphoid for typhoid being slight. Blood culture is therefore the only reliable method to ascertain whether a typhoid infection occurring in a vaccinated person is due to *B. typhosus* or to one of the paratyphoid germs. (E. Rist, *Journal of Laboratory and Clinical Medicine, St. Louis.* Reprinted from *The Journal of the American Medical Association.*)

War Wounds Treated with Flavine.—This is the authors' report to the medical research committee. Flavine was tested out by Drummond and McNee clinically as well as in the laboratory. Seventy patients, many having multiple injuries, were treated. The flavine was at first employed in a strength of 1 in 1,000, the dilution being made in normal saline solution, in which the powder is readily soluble. This routine was soon given up, however, as it was found that equally good results ensued if the use of 1 in 1,000 solution for the first dressing was followed by the employment of a solution 1 in 5,000 for all subsequent applications. In some cases, also, where the Carrel method of irrigation was being used, the strength of the solution was further reduced to 1 in 10,000. The surgical methods adopted depended on the type of injury met with. Long incisions, with free excision of damaged muscle and fascia, must be regarded as a cardinal part of all operative treatment in recent wounds, no matter what subsequent methods are employed. After this preliminary surgical treatment the wounds treated with flavine were dealt with in the following ways: (1) Primary suture; (2) drainage by tube or gauze strip, followed by secondary suture; (3) the Carrel method of intermittent irrigation; (4) gauze packing in open wounds. Wounds treated by excision of the infected and damaged tissue, followed by primary suture, gave excellent results.

Secondary suture gave good results in all the cases in which it was adopted. In open wounds on removal of the first dressing on the third day the wound, except for being deeply stained with flavine, has undergone no alteration whatever in its appearance, and resembles an injury only a few hours old. All signs of inflammation are wanting, and there is no pain, redness, swelling, or induration in the tissues around. The secretion from the wound is minimal in amount and suppuration is absent. The complete absence of suppuration, even in wounds where films show abundant organisms to be present, is a noteworthy feature in wounds under treatment with flavine. When dressed again at the end of a week the skin edges are found clean cut, no epithelial growth having taken place from the edges. The floor of the wound has by this time become covered by a closely adherent membrane, only detached with difficulty from the underlying structures. This yellow pellicle forms over whatever tissue is exposed in the wound, whether it be muscle or subcutaneous fat. Experience has shown that a wound heals with much greater rapidity if the flavine be stopped after three or four days in the case of small wounds, and after about a week in the case of severe wounds or compound fracture.

Flavine appears to have many advantages as a primary treatment of recent war wounds. Among the advantages are: (*a*) The absence of all toxicity, even in large wounds. (*b*) The prevention of suppuration and of spreading sepsis. (*c*) The primary dressing need not be changed for two or three days, and is then easily and painlessly removed. This may be of great advantage during severe fighting, where rapid evacuation of wounded from front to base is required without unnecessary dressing of the wounds. (*d*) The wounds are not inflamed and painful, and the surrounding skin is never irritated. Flavine cannot be classed as a success in the treatment of the later stages of war wounds. The wounds tend to assume a stagnant condition, during which the processes of repair are almost in abeyance. After a few days, when the danger of gas gangrene and of spreading sepsis have to a great extent passed off, flavine should be stopped and another treatment adopted. In the majority of cases war wounds are not rendered bacteriologically sterile even by the prolonged use of flavine. Test-tube experiments carried out with organisms isolated from actual wounds bear out the strong antiseptic properties of flavine, and their enhancement

in the presence of serum. Coliform bacilli, which are a common infection in the later stages of wounds, are much more resistant to the action of the antiseptic in test-tube experiments than any of the other types of organism examined in this way. (H. Drummond and J. W. McNee, *Lancet.* Reprinted from *The Journal of the American Medical Association.*)

BOOK REVIEWS.

QUALITATIVE CHEMICAL ANALYSIS, Henry W. Schimpf, Ph.G., M.C., Professor of Analytical Chemistry in the Brooklyn College of Pharmacy. Third edition, Revised. ix + 187 pages, 6 × 9. Cloth, $1.50 net. John Wiley and Sons, Inc., New York, 1917.

In his preface the author states that he is "encouraged to publish a new and revised edition" because of the "exhaustion of the second edition of this book and the greatly increased demand for it" —a statement which one can well believe after having examined the book even only superficially.

The subject matter is considered under three heads:

Part I. Definitions and General Considerations,
Part II. Identification and Separation of Inorganic Bases and Acids.
Part III. Qualitative Analysis of Organic Substances.

Part I, covering 16 pages, gives in plain, easily understood, language the theoretical information that the student most needs before he begins the actual wrestle in the laboratory with test-tube, filter, funnel and reagent.

Part II treats, first, of the use of apparatus and reagents, then takes up in detail the metals and the more common of the acids, the student being taught how to recognize basic and acidic constituents, first of simple salts, then of mixtures of salts. The reactions are generally illustrated by equations, and reasons are given for each step in any process. Numerous charts are given, generally so plainly worded that the veriest tyro should have but little difficulty in using them intelligently, and even the experienced worker should find them helpful.

Part III treats, first, of the identification of the constituent elements of organic substances, then takes up in turn the use of immiscible solvents, use of Fehling's solution, detection of the more

common of the organic compounds of pharmaceutical interest (including alkaloids, glucosides, the official synthetics and the scaled iron compounds), detection of poisons, urinalysis, preparation of reagents. This portion should appeal to the everyday worker who does any chemical testing whatsoever.

The author claims only to have authority to use for comment the U. S. P. VIII, but gives a number of tests based on the U. S. P. IX, giving due credit therefor. The paper and typography of the book are good, but there is abundant evidence of carelessness in proof-reading, an exceptionally large number of errors appearing on its pages. Fortunately, most of them are of minor importance and are so apparent as not to lead the experienced chemist far astray, but some of them might give students, for whom the book is avowedly intended, considerable trouble. On page 52 the equation given under test 83 belongs under test 84, and a correctly written one should appear under test 83; on page 57, section 63, in the second part of Division *B* something has been omitted (probably "add $(NH_4)_2S$"), as Co and Ni chlorides are water-soluble; the last two parts of the same division should read "Solution = Ni" and "Ppt = Mn," to make the statements accord with those given under 27 and 28 on page 58; near the middle of page 117 the word "cuprous" is used where "copious" was probably intended. It seems strange, to say the least, that a newly revised book should take so little cognizance of the work done by chemists during the last thirty years as to limit the number of known elements to "about seventy-four" (page 3), to still consider that acids "are hydroxids of the non-metals" (page 8), and to so carefully omit any reference to the existence of ions and the part they play in analytical reactions. However, the book is well worth a place on the busy chemist's or pharmacist's laboratory table.

F. P. Stroup.

Medical Bacteriology, by John A. Roddy, M.D., P. Blakiston's Son & Co., Publishers, Philadelphia, Pa. Price, $2.50.

The rapidity with which the modern science of bacteriology has been developed has been such that many of those practicing medicine, veterinary medicine, dentistry and pharmacy are but poorly equipped with a knowledge of this science, which is playing an increasingly important rôle in the diagnosis, cure and prevention of

diseases. Bacteriology is likewise now an established adjunct to the work of the chemist and analyst, as many of the chemical problems are so closely interwoven with bacterial study that a working knowledge of bacteriology is essential for the chemist who would solve these.

The specialist in bacteriology may have access to the voluminous studies and works on the subject and to the extensive current literature relating to that science, but the busy practitioner of medicine, the pharmacist and the chemist as a rule can devote but a moderate amount of time to such study. The book now before us fills in an excellent manner the needs of these busy workers for such accurate, up-to-date information on bacteriology as is essential to their needs.

In the 285 pages with the 46 illustrations the author has presented a concise and accurate résumé of bacteriology as relating to medicine. Despite the conciseness, the method of presentation is clear and interesting.

Part I of the book entitled "Medical Bacteriology" occupies 171 pages. Part II, "Bacteriology," in 103 pages discusses a number of subjects such as the examinations of water, milk and eggs, and the determination of the germicidal value of disinfectants which might be considered as in the domain of *technical* bacteriology and in other chapters considers "Diagnosis," "Bacterial Vaccines," "Therapeutic Sera," "The Wassermann Test" and "Immunity." The differentiation in the classification of these subjects, which certainly are medical, is not clear to us.

Of the 49 short chapters included in Part I, 42 of these are devoted to the individual presentation of established types of germs, as for example Chapter VII deals with Staphylococci and Chapter VIII with Streptococci. Each chapter sets forth in paragraphs with titles in boldfaced type the subject matter clearly and this is well supplemented by the illustrations.

In Chapter II, "Classification," the author uses the terms "higher bacteria" and "higher forms of bacteria" for organisms that are not classified as "rod-shaped Schizomycetes" (*bacteria*) or even as belonging to the Schizomycetes, and in a subsequent chapter on "Staining" names as Higher Bacteria, Leptothrices, Cladothrices, Streptothrices, Saccharomycetes and Hyphomycetes. The author has thus laid the foundation for his treatment in sub-

sequent individual chapters of such subjects as molds and yeasts. No fault can be found with the statements in these chapters or with the advisability of including in a handbook for the practitioner such related subjects as are known to be the causes of disease. However, there is here raised the question whether an author in writing on a scientific subject is justified, simply for the convenience of presenting his subject, in setting aside the established botanical and scientific classification of the fungi that differentiates the Saccharomyces, the Zygomyces, the Hyphomyces, the Schizomyces, etc., and jumbling them under a title that is properly limited to only one section of Schizomycetes. Especially so when a modification of the title of his book would have avoided such unscientific methods and criticism.

Not the least valuable are the chapters on Staining, Culture Media and Sterilization. The inclusion in the latter of information on the newer antiseptics, such as the "Dakin Solution," indicates the modern and comprehensive scope of the book.

The book is a valuable aid to the diagnostician and clinician as well as to the laboratory worker in bacteriology and chemistry and should prove to be the handy volume to all of these.

G. M. B.

THE TREATMENT OF EMERGENCIES, by Hubley R. Owen, M.D., Chief Surgeon of the Philadelphia Police and Fire Bureaus, etc., etc. 350 pages, W. B. Saunders Co., Publishers, Philadelphia.

Dr. Owen in his preface explains the object of the book. He says: "The book is essentially an enlargement of the lectures delivered to the Training Schools of the Policemen and Firemen of Philadelphia, etc. While collecting data for these lectures I was unable to find a book on First Aid, or the Treatment of Emergencies in which the principles of, and the reasons for, the application of first-aid dressings were fully understood."

The typographical features of the book are excellent, the paper is good and the type clear and distinct. The illustrations, which are a prominent feature of the book, are mostly photographic reproductions, obtained through the coöperation of the police and fire departments. The book is quite up-to-date; for instance, Dr. Owen says: "The war in Europe has upset many of the traditions and teachings concerning wounds produced by military bullets. The

military bullet was believed to be humane. It was said that it seldom carried dirt, clothing or other foreign material into the wound, etc. The present war has shattered these beliefs. Modern trench war has profoundly modified the character of military wounds. A large proportion of wounds in the present war are infected, etc. The two most serious forms of infection have been tetanus (lock-jaw) and gas gangrene."

Chapter VII on Asphyxiation is of special value, the subject being treated in a clear and forceful manner, much information being given not obtainable from other sources. Dr. Owen's experience at fires enabling him to treat of smoke asphyxia in all its phases. In Chapter XI effects produced by lightning are treated of more extensively than is usually done in a book of this kind. It is stated that about 224 persons are killed by lightning annually in the United States. Excellent advice is also given regarding the danger of electric currents, and the best way to handle "live wires."

The book would be a valued addition not only to the library of the physician, but also to that of the pharmacist.

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